7. ORNITHOLOGY

7.1 Introduction

This chapter of the remedial Environmental Impact Assessment Report (rEIAR) assesses the likely effects that the Cleanrath wind farm development may have had on avian receptors due to the construction of the development, during the brief period of operation and current period where the turbines are in Sleep Mode. Any potential for long-term effects that may be encountered during the operation of the wind farm, should it be granted, are also assessed, along with any potential effects associated with the decommissioning of the wind farm, either at the end of its operational lifespan or prematurely if required. Particular attention has been paid to species of ornithological importance. These include species with national and international protection under the Wildlife Acts 1979-2012 as amended and the EU Birds Directive 2009/147/EC among other relevant legislation. Where potential effects are identified, mitigation is described and residual impacts on avian receptors are assessed.

This chapter is supported by Technical Appendices 7-1 to 7-4 and 7-7 to 7-8, which contain the data from the surveys undertaken including full details of the survey times, weather conditions, and other relevant information together with the bird records themselves. Appendix 7-5 contains the Collision Risk Assessment document which illustrates how the Collision Risk Modelling was undertaken for this site. Appendix 7-6 contains the Post-Construction Bird Monitoring Programme. The Cleanrath wind farm development and areas surveyed are provided in Figures 7-1 – 7-8.

The chapter is structured as follows:

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

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

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

7.1.1 Description of the Cleanrath Wind Farm Development

This section provides an overview of the Cleanrath wind farm development. Chapter 2 Planning Policy describes in detail the Planning History of the site and Chapter 4 Description, provides the detail with regards the various components of the Cleanrath wind farm development.

The development which was actually completed and/or commenced pursuant to the 2017 permission comprised;

- 9 No. wind turbines with a ground to blade tip height of 150 metres and all associated foundations and hard-standing areas.
- All associated underground electrical (33kV & 38kV) and communications cabling connecting the turbines to the national electricity grid.
- Upgrade of existing access junctions and roads.
- Upgrade of existing and provision of new site access roads.
- Borrow pit.
- Temporary construction compound.
- Accommodation works along the turbine delivery route
- Temporary roadway to facilitate turbine delivery.
- Forestry Felling
- Site Drainage.
- The operation of the wind farm for a period of 25 years.
- The decommissioning of the wind farm, removal of turbines and restoration of the site.
- All associated site development and ancillary works.

The future development components, which comprise the focus of the EIAR (but are also set out in this rEIAR) comprise,

- The current 'Sleep Mode' operations
- Future full operation of the wind farm
- Ongoing Maintenance
- Peatland Habitat Restoration
- Monitoring
- Decommissioning (early or post full operational period)

The application for the 2017 Permission made provision for the development of grid connection infrastructure arising from the amalgamation of the power generated from the Cleanrath wind farm development and the nearby Derragh wind farm development. This involved the cabling from the Cleanrath wind farm development looping into the Derragh site where the power is combined at the Derragh substation and exported to the national electricity grid at Coomataggart substation (Co. Kerry) along the underground cable route included and assessed in the 2017 Permission. The Derragh substation, which was amended and re-located within the Derragh wind farm site (granted permission under Pl. Ref. 17/5126), facilitated this amalgamation of the power from the wind farms and therefore the Derragh substation is assessed as part of the project.

7.1.2 Legislation, Guidance and Policy Context

This rEIAR is prepared in accordance with the requirements of the 2011 EIA Directive (Directive 2011/37/EU) as amended by EIA Directive 2014/52/EU, the Planning and Development Acts 2000-2019, the Planning and Development Regulations 2001-2019 and the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

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

- Irish Wildlife Acts 1976 to 2012 as amended.

- The European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) (transposes EU Birds Directive 2009/147/EC and EU Habitats Directive 92/43/EEC).
- The European Communities (Birds and Natural Habitats) (Sea-fisheries) Regulations 2013 (S.I. No. 290 of 2013).
- The European Communities (Birds and Natural Habitats) (Amendment) Regulations 2013 (S.I. No. 499 of 2013).
- The European Communities (Birds and Natural Habitats) (Amendment) Regulations 2015 (S.I. No. 355 of 2015).
- The International Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971.

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

- SNH (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms.* Scottish Natural Heritage.
- SNH (2018) *Avoidance rate information & guidance note: Use of avoidance rates in the SNH wind farm collision risk model.* Scottish Natural Heritage, Edinburgh, UK.
- SNH (2016). *Assessing Connectivity with Special Protection Areas (SPAs).* Scottish Natural Heritage.
- SNH (2012). *Assessing the Cumulative Impact of Onshore Wind Energy Developments.* Scottish Natural Heritage.
- SNH (2006). *Assessing Significance of Impacts from Onshore Windfarms on Birds Outwith Designated Sites.* Scottish Natural Heritage.
- SNH (2009). *Monitoring the impact of onshore wind farms on birds.* Scottish Natural Heritage.
- SNH (2000). *Wind farms and birds: calculating a theoretical collision risk assuming no avoidance action.* SNH Guidance Note.
- (CIEEM, 2018). Guidelines for Ecological Impact Assessment (EcIA).

The following Irish Guidance documents were also consulted:

- Percival, S.M. (2003). *Birds and wind farms in Ireland: A review of potential issues and impact assessment.* Ecological Consulting.
- McGuinness, D., Muldoon, C., Tierney, N., Cummins, S., Murray, A., Egan, S. & Crowe, O. (2015). *Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland.* Guidance Document. Birdwatch Ireland.
- Birds of Conservation Concern in Ireland 2014-2019 (Colhoun, K. and Cummins, S. 2013).

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

- Planning and Development Acts 2000 – 2018.
- Cork Country Council (2014). Cork County Development Plan 2014-2020.
- EPA (2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports – Draft August 2017'.
- EPA (2015) 'Revised Guidelines on the Information to be contained in Environmental Impact Statements – Draft September 2015'
- EPA (2015) 'Advice Notes for Preparing Environmental Impact Statements – Draft September 2015'.
- EPA (2003) 'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements'

- EPA (2002) 'Guidelines on the Information to be contained in Environmental Impact Statements'
- DoEHLG (2013). *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment.* Department of the Environment, Community and Local Government (where relevant).
- European Commission (2011). *Wind energy development and Natura 2000.* Guidance document.
- European Commission (2017). Environmental Impact Assessment of Projects.
- Draft Revised guidelines on the information to be contained in Environmental Impact Statements (EPA, 2017).
- EPA (2003). *Advice notes on current practice (in the preparation of Environmental Impact Statements* (where relevant).
- EPA (2002). *Guidelines on the information to be contained in Environmental Impact Statements.* Environmental Protection Agency (where relevant).
- NRA (2009). *Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2).* National Roads Authority.
- European Commission (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites.*

7.1.3 Statement of Authority and Competence

This ornithology chapter has been prepared by Ecologist, Mr David Naughton (BSc.) and Senior Ornithologist, Mr. Padraig Cregg (BSc., MSc.) of MKO. Both are suitably qualified, competent, professional ecologists with extensive experience of completing avifaunal assessments and are competent experts for the purposes of the preparation of this rEIAR. The scope of works and survey methodology was devised by Senior Ornithologist, Padraig Cregg (BSc.) (February 2015 to March 2017) and is compliant with recent SNH guidance. The chapter has been reviewed by Pat Roberts (B.Sc., MCIEEM).

Field surveys were undertaken by Padraig Cregg (BSc., MSc.), Daelyn Purcell (BSc.), John Curtin (BSc), John Carey (PhD) and Sarah Ingham (MSc.). All of the surveyors listed above are competent experts for the purposes of the preparation of this rEIAR and suitably qualified.

This assessment has been subject to independent review by Dr. Tom Gittings (Ph.D). Dr. Gittings is an accomplished, qualified, and recognised expert in the field of ornithology.

7.2 Assessment Approach and Methodology

7.2.1 Desk Study

A comprehensive desk study was undertaken to search for any relevant information on species of conservation concern which may potentially have made use of the Cleanrath wind farm development or the surrounding areas. The assessment included a thorough review of the available ornithological data including:

- Review of online web-mappers: National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC), Irish Wetland Bird Survey I-WeBS.
- Review of Bird Atlases: (Sharrock, 1976; Lack, 1986; Gibbons et al., 1993; Balmer et al., 2013).
- Review of Birds of Conservation Concern (BoCCI) in Ireland 2014-2019 (Colhoun & Cummins, 2013).
- Review of specially requested records from the NPWS Rare and Protected Species Database.
- Review of impact assessments associated with nearby developments including wind farms.

7.2.2 Consultation

7.2.2.1 Scoping and Consultation

Consultation was undertaken with the relevant statutory and non-statutory organisations as part of the rEIAR scoping to inform the current assessment. Full details can be found in Section 2.5 of Chapter 2.

Table 7-1 provides a list of the organisations consulted with regard to Ornithology during the scoping process and notes where scoping responses were received.

Copies of all scoping responses are included in Appendix 2-3 of this rEIAR. The recommendations of the consultees have informed the rEIAR preparation process and the contents of this chapter. Table 2-4 in Chapter 2 of this rEIAR describes where the comments raised in the scoping responses received have been addressed in this assessment.

Table 7-1 Consultation Responses

	Consultee	Response	Issues Raised	Action Required
01	An Taisce	No Response Received	N/A	N/A
02	BirdWatch Ireland	No Response Received	N/A	N/A
03	Department of Agriculture, Food and the Marine	Response Received 10th of June 2020	Felling Licence required if tree felling will be undertaken	Onsite felling was conducted under a felling licence.
04	Irish Peatland Conservation Council	No Response Received	N/A	N/A

	Consultee	Response	Issues Raised	Action Required
05	Irish Red Grouse Association	No Response Received	N/A	N/A
06	Irish Raptor Study Group	No Response Received	N/A	N/A
07	Irish Wildlife Trust	No Response Received	N/A	N/A
08	National Parks & Wildlife Services	Response Received 6th of May 2020	See Section 7.3.5 in this Chapter	N/A

7.2.3 Identification of Target Species and Key Ornithological Receptors

This section of the report describes the criteria used for the selection of target species. The methodology for assessment followed a precautionary screening approach with regard to the identification of Key Ornithological Receptors. Following a comprehensive desk study, initial site visits and consultation, a list of "Target species" likely to occur in the zone of influence of the Cleanrath wind farm development was derived. The observation/survey work carried out on the site was specifically designed to survey for these identified target species in accordance with SNH guidance (2017). The target species list (see Appendix 7-1) was drawn from:

- Annex I of the EU Birds Directive.
- Special Conservation Interests (SCI) of Special Protection Areas (SPA) within the zone of likely significant effect.
- Species protected under the fourth schedule of the Wildlife Acts 1976-2018.
- Red and Amber listed birds of Conservation Concern.

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

7.2.4 Field Surveys

Field surveys were undertaken by McCarthy Keville O'Sullivan Ltd. (MKO) between February 2015 and March 2017, which includes two full breeding seasons and two non-breeding seasons in line with SNH (2017). This data comprises the core data set used to inform the impact assessment. It is supplemented by bird survey data gathered during pre-commencement monitoring at the Cleanrath wind farm development between June 2018 and August 2018, and bird survey data gathered during operational monitoring at the Cleanrath wind farm development, between January 2020 and May 2020. The supplementary data gathered during pre-commencement and operational is clearly defined throughout this report and has been used to compare against the predictions made using the core dataset (February 2015 to March 2017) during the impact assessment.

The data provided in this report is robust and allows clear, precise and definitive conclusions to be made on the avian receptors identified within the Cleanrath wind farm development and surrounding areas. Field survey methodologies were devised to survey for the bird species composition and assemblages that occur within the study area and its hinterland and which are potentially susceptible to impacts from this type of development.

7.2.4.1 Initial Site Assessment

Based on the results of the desk study, consultation and 2011/12 winter season bird surveys, the likely importance of the study area for bird species was ascertained. Based on the collated information available from the above preliminary assessment and adopting a precautionary approach, a site-specific scope for the ornithological surveys was developed.

7.2.4.2 Survey Methodologies

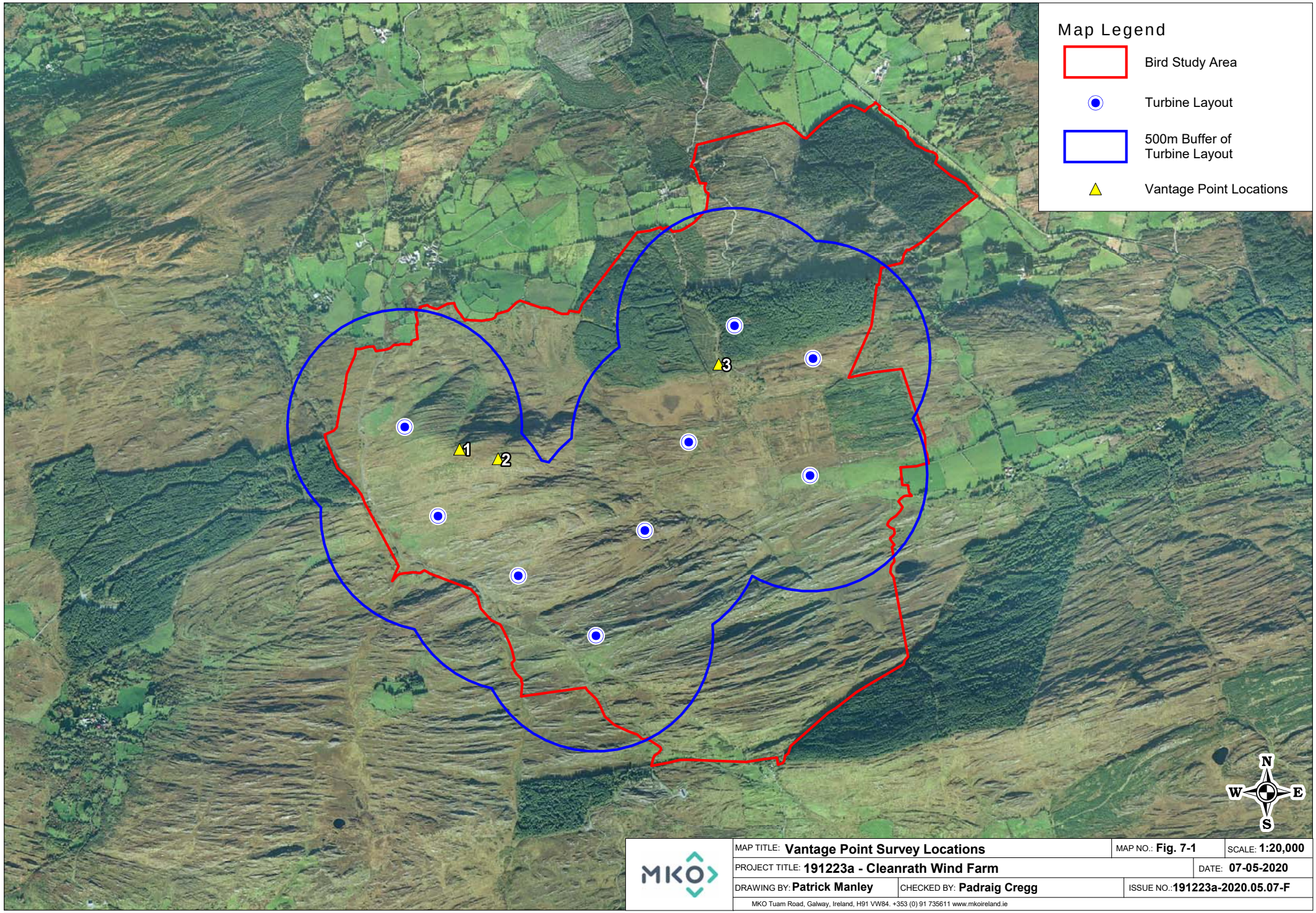
The survey work undertaken between February 2015 and March 2017 forms the core dataset for the assessment of effects on ornithology, which includes two full breeding seasons and two non-breeding seasons in line with SNH (2017). This data is supplemented by pre-commencement and operational monitoring bird surveys which took place between June and August 2018, and January and May 2020 respectively.

In the absence of specific national bird survey guidelines, the ornithological surveys were designed and undertaken in full accordance with '*Recommended bird survey methods to inform impact assessment of onshore wind farms'* (SNH, 2017).

The various survey types undertaken are described below.

7.2.4.2.1 *Vantage Point Surveys*

Vantage point surveys were undertaken in accordance with SNH guidance from February 2015 and February 2017. Surveys were conducted monthly throughout this survey period from three fixed point vantage points (VP1 – VP3) to allow comprehensive coverage of all turbines in accordance with SNH 2017. Vantage point surveys are designed to quantify the level of flight activity and its distribution over the survey area. The primary purpose of the survey is to provide data to inform the collision risk model, which makes predictions of mortality, from collisions with turbines. The validity of vantage point surveys were confirmed by MKO by conducting viewshed analysis, as described below, and further checked during initial field surveys. Figure 7-1 shows the locations of all vantage points relative to the development site.



MAP TITLE: **Vantage Point Survey Locations**		MAP NO.: **Fig. 7-1**	SCALE: **1:20,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **07-05-2020**
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Viewshed Analysis

Viewshed analysis was carried out to confirm coverage of the study area from fixed vantage point locations (i.e. VP1 – VP3). Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with Mapinfo Professional (Version 10.0) using a notional layer suspended at 32.5m, which is representative of the lowest swept rotor height of the turbines at the Cleanrath wind farm development. While the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds.

The area visible from each vantage point was ground-truthed (i.e. confirmed during field surveys) to incorporate landscape features (e.g. woodland, spoil heaps etc.) into the analysis that would not otherwise be accounted for in the computer modelling programme. The vantage points were selected to effectively survey the rotor swept area of all turbines.

The viewshed analysis involved testing each VP location for its visibility coverage by creating a viewshed point 1.5 meters in height (to represent the height of observer) on a map using 10 metre contours terrain data. The relative height of forestry and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360 degrees was produced calculating an area 32.5 metres from ground level up to a 2km radius from the VP location. The resulting viewshed image was then cropped to 180 degrees to give the viewshed orientation and visible survey area from each VP location in line with SNH (2014, 2017).

In order to ensure that the viewsheds provided sufficient coverage of the turbines and 500m of same, a 500m buffer was applied to the outer most turbines of the wind farm development in line with SNH (2014, 2017). The viewshed analysis highlights that the rotor swept area (i.e. potential collision height) of all turbines was visible and surveyed throughout the two-year survey period. The visible view shed at 32.5m is presented on Figures 7-2, 7-2-1, 7-2-2 and 7-2-3.

Data Recording and Digitisation

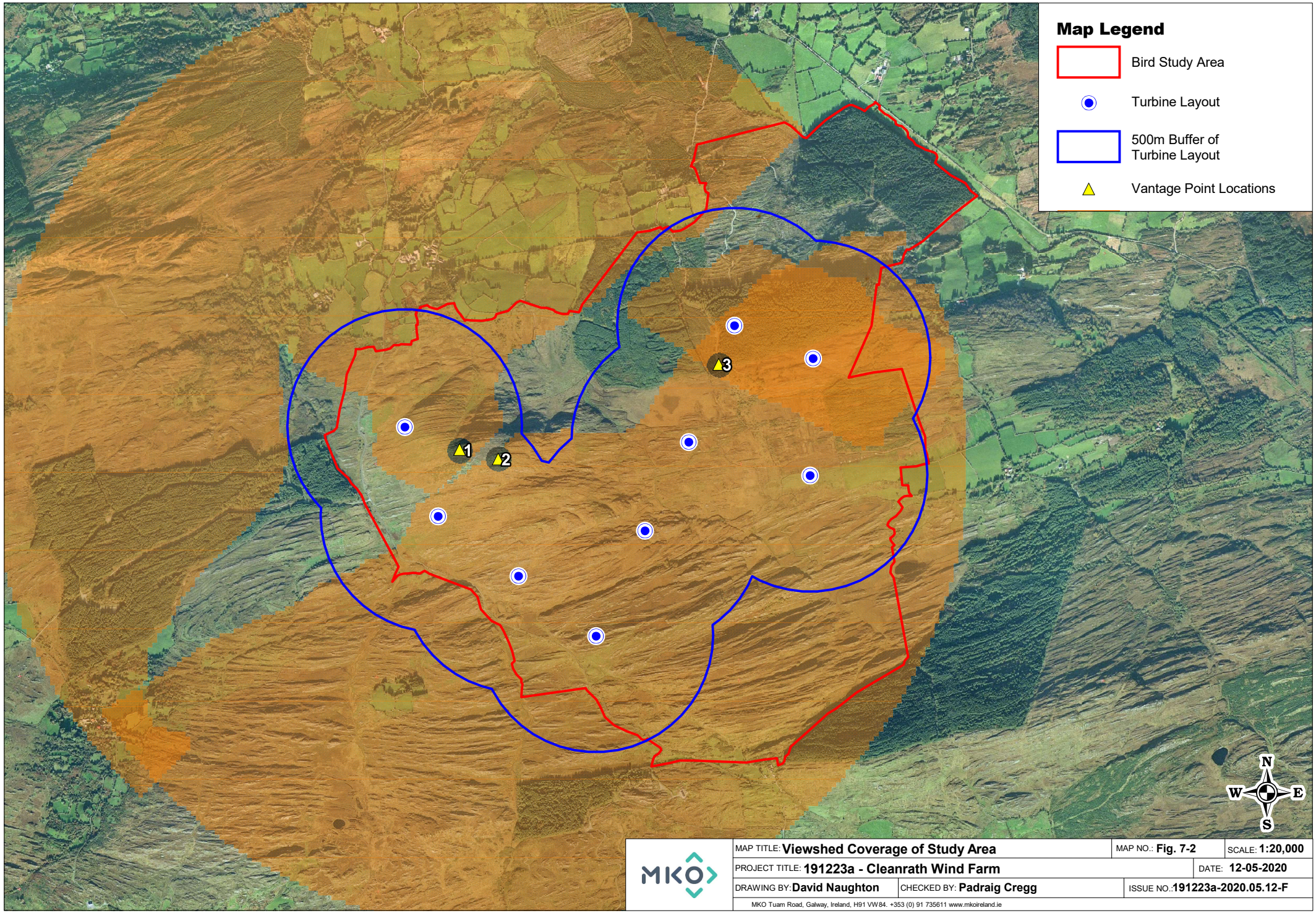
Data on bird observations and flight activity was collected from a scanning arc of 180° within a 2km radius of each fixed VP by a surveyor for six hours per month (SNH 2017). Due to weather constraints, some surveys ended early but were continued at a later date in the month to ensure that six hours of surveys were conducted per month in accordance with SNH guidance (2017). Surveys were scheduled to provide a spread over the full daylight period including dawn and dusk watches to coincide with the peaks in bird activity. Target species were as per listed in Table 1 of Appendix 7-1.

Survey effort for vantage point watches is presented in Appendix 7-2, Table 1. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Table 7-2 below shows a summary of the VP survey work undertaken.

Table 7-2 Vantage Point Survey Effort

Survey Season	Months	Minimum Effort per VP
2015 Breeding Season (3VPs)	Feb-Aug	40 hours/VP
2015/2016 Non-Breeding Season (3VPs)	Sep-Feb	36 hours/VP
2016 Breeding Season (3VPs)	Mar-Aug	45 hours/VP
2016/2017 Non-Breeding Season (3VPs)	Sep-Feb	36 hours/VP

Birds which use the airspace around turbines are susceptible to collision with operating turbines. The swept area of the rotor blade is the area in which a collision is theoretically possible. Possible collision height (PCH) is therefore defined as the area of space occupied by the turbine rotors.



MAP TITLE: **Viewshed Coverage of Study Area**		MAP NO.: **Fig. 7-2**	SCALE: **1:20,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **12-05-2020**
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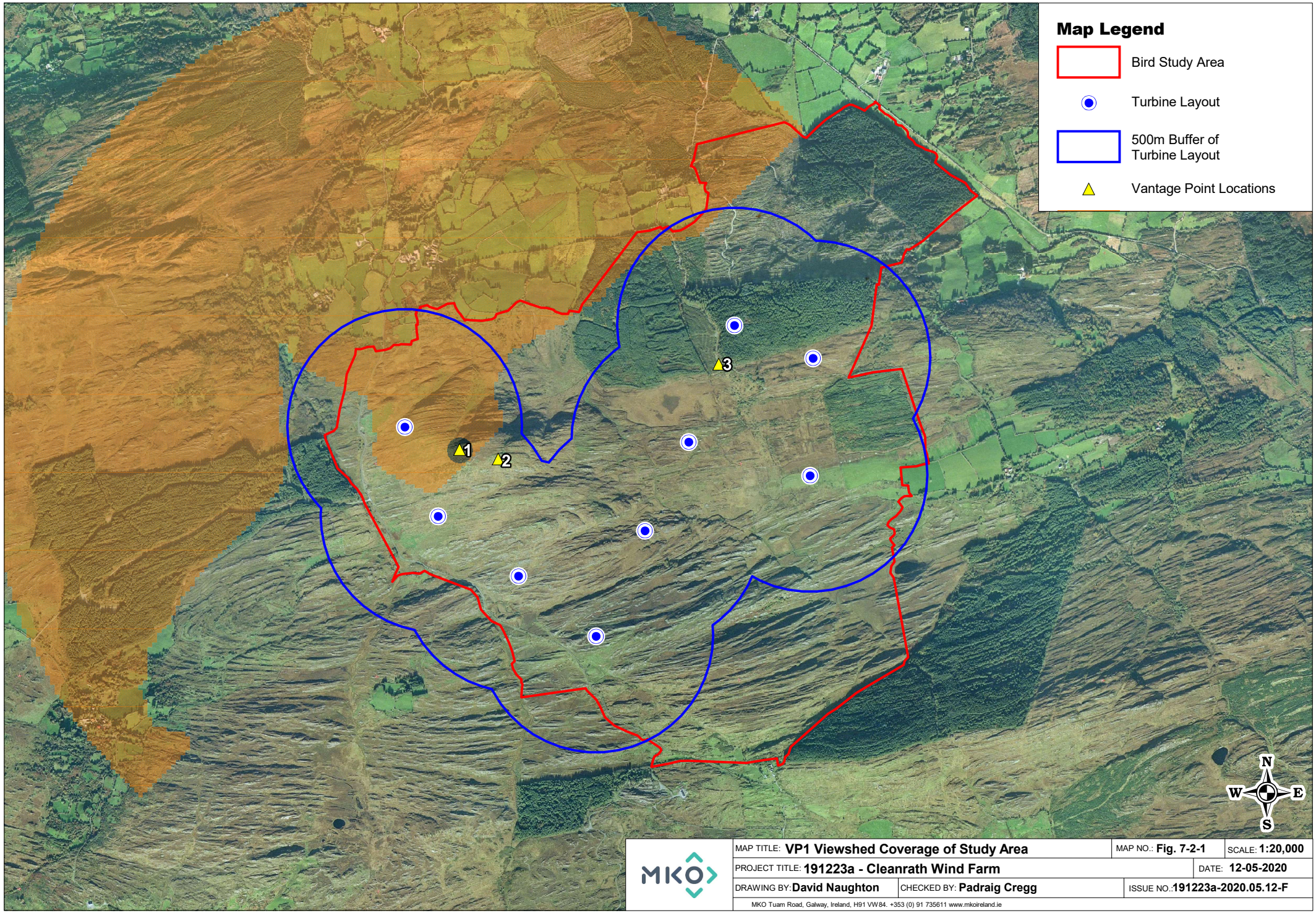

MAP TITLE: **VP1 Viewshed Coverage of Study Area**		MAP NO.: **Fig. 7-2-1**	SCALE: **1:20,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **12-05-2020**
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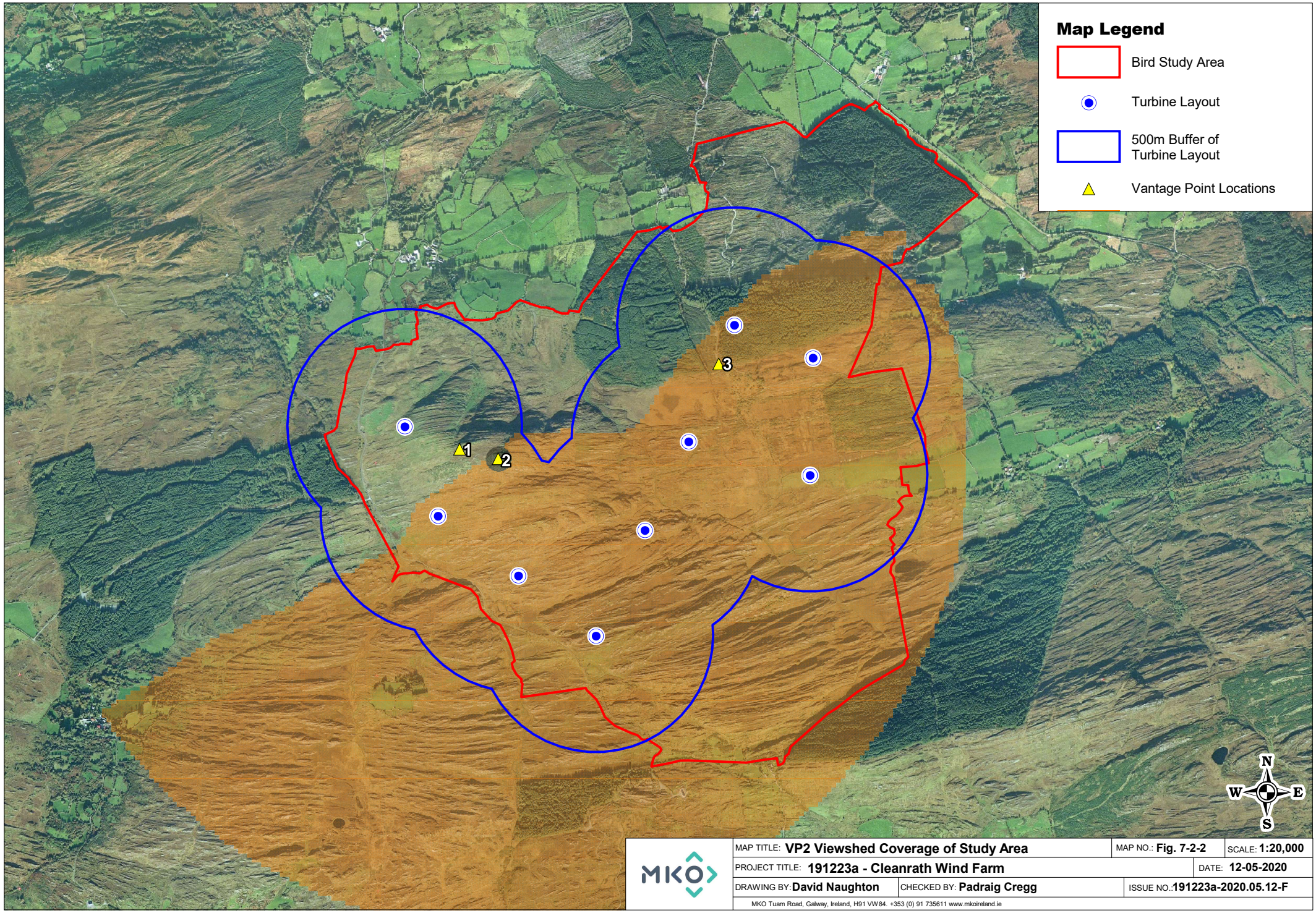

MAP TITLE: **VP2 Viewshed Coverage of Study Area**		MAP NO.: **Fig. 7-2-2**	SCALE: **1:20,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **12-05-2020**
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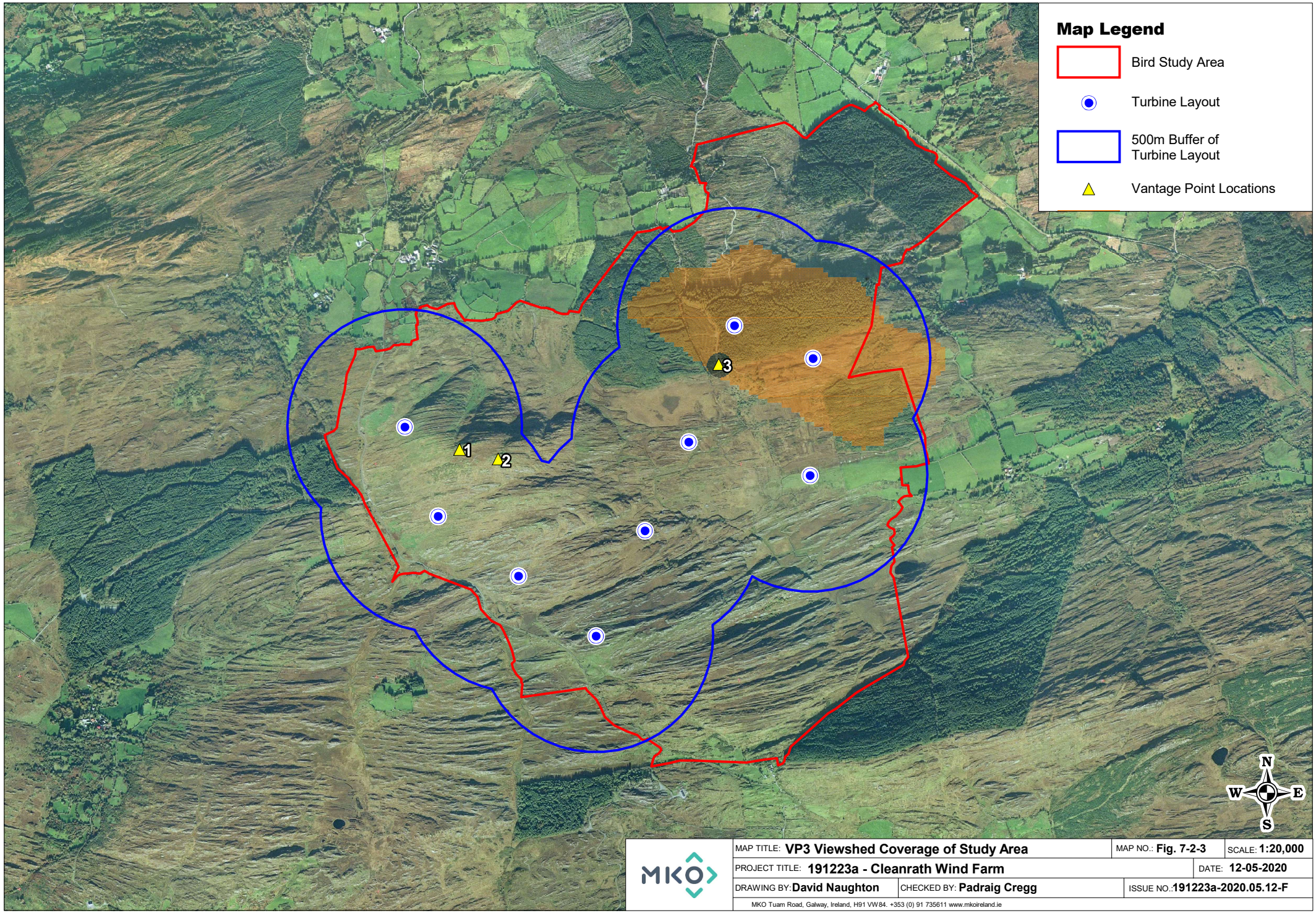

MAP TITLE: **VP3 Viewshed Coverage of Study Area**	MAP NO.: **Fig. 7-2-3**	SCALE: **1:20,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**		DATE: **12-05-2020**
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Observed flight activity was recorded as per defined flight bands which were chosen in relation to the dimensions of potential turbine models to be used at the Cleanrath wind farm development.

Bands were determined prior to final selection and construction of the turbines. Initial height bands used for recording flight data were split into bands 0-10m, 10-100m and 100m+ which were used during VP surveys between February 2015 and March 2016. In April 2016 height bands were revised to incorporate modern turbine dimensions. Height bands 0-10m, 10-25m, 25-175m and 175m+ were used for the period April 2016 to February 2017. Taking a highly precautionary approach, both height bands were combined, for collision risk modelling purposes, the height bands 10-100m and 100m+, were both combined and included in the newer height band of 25-175m. All flight activity within the combined height band of 25-175m is considered to be within the Potential Collision Height (PCH) with regard to the turbine swept area, based on a worst-case scenario for collisions risk modelling. This height band incorporates the actual swept area of the turbines (i.e. 32.5m – 150m), leaving a considerable amount of height below and above PCH to account for any potential surveyor error.

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

7.2.4.2.2 Breeding Bird Surveys (Adapted Brown & Shepherd Methodology)

Breeding walkover surveys were undertaken to determine the presence of bird species of high conservation concern and identify areas of possible, probable or confirmed breeding territories for bird species observed within the study area. The survey methodology followed the Adapted Brown and Shepherd method for upland sites as outlined in Gilbert et al. (1998) and SNH (2017) ('adapted Brown and Shepherd surveys'). In addition, surveyors visited prominent features (e.g. fence posts) within the Cleanrath wind farm development to search for signs of raptor activity (e.g. merlin) such as pellets or plucked feathers.

Transect routes were devised to ensure coverage of different habitats within the study area. Target species were waders, raptors, 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, June, July, August and September of 2015 and April, May, June, July and August 2016. 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.

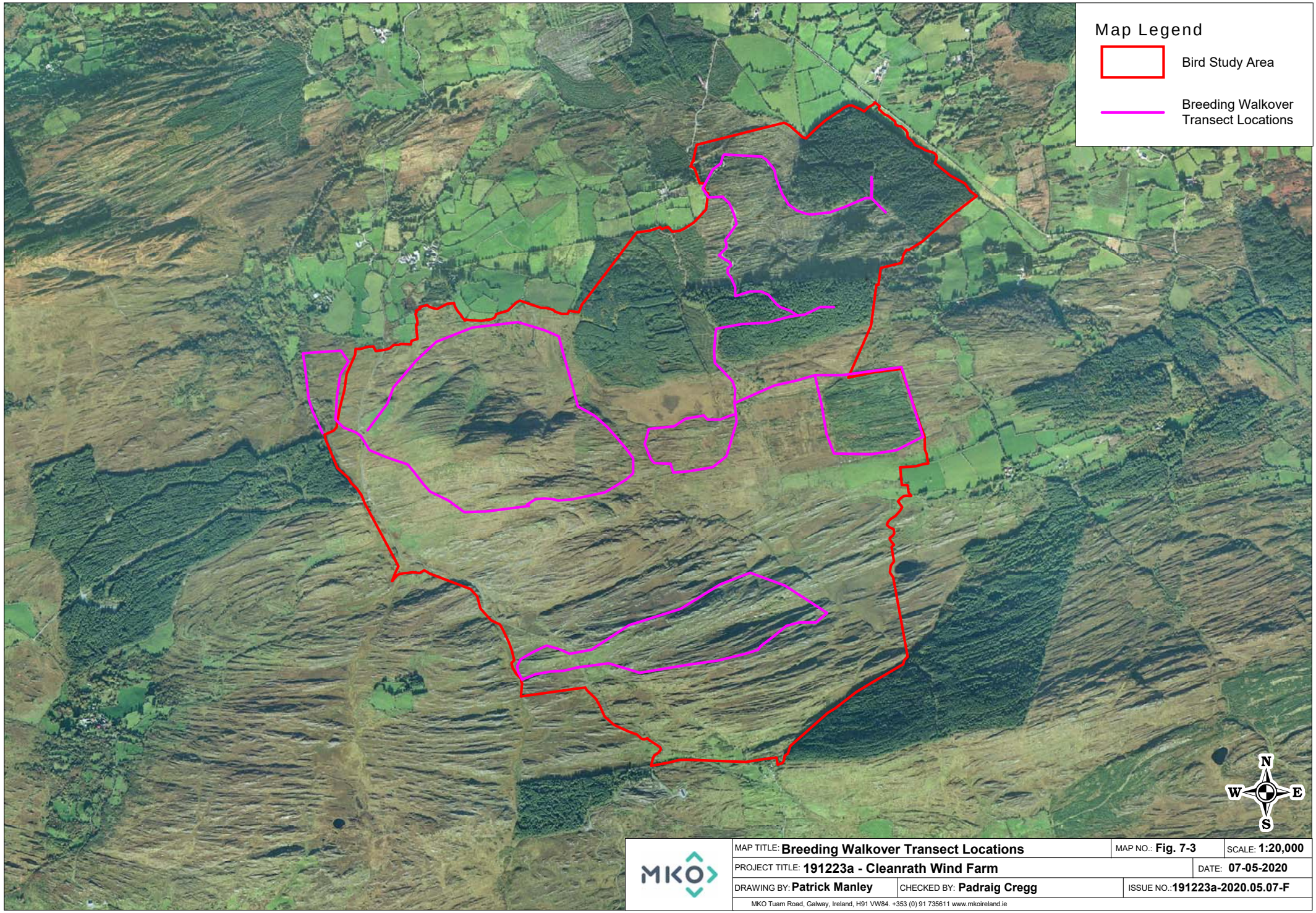
Survey effort is presented in Appendix 7-2, Table 3. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Figure 7-3 shows the transect routes surveyed.

7.2.4.2.3 Breeding Raptor Surveys

Breeding raptor surveys (i.e. birds of prey and owls) were conducted within the study area and its immediate surrounds during both the 2015 and 2016 breeding seasons (April – July). Survey methodology was as outlined in Hardey et al. (2013). Breeding Raptor Surveys aimed to cover all areas of suitable raptor breeding habitat within 2km of the site boundary, including hen harrier, merlin, peregrine, barn owl and other raptor species. This included surveying suitable buildings (where access allowed) (as per SNH 2017 recommendations for surveying owls) of the site for barn owl.

Raptor surveys, in the form of walked transects and short VP watches, were conducted within a 2km radius of the site boundary on a monthly basis during the core breeding season (April – July). The aim of these surveys was to identify occupied territories and establish whether breeding was successful

within the study area. Survey effort details are provided in Appendix 7-2, Table 6. Figure 7-4 shows the areas surveyed.



MAP TITLE: **Breeding Walkover Transect Locations**		MAP NO.: **Fig. 7-3**	SCALE: **1:20,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **07-05-2020**
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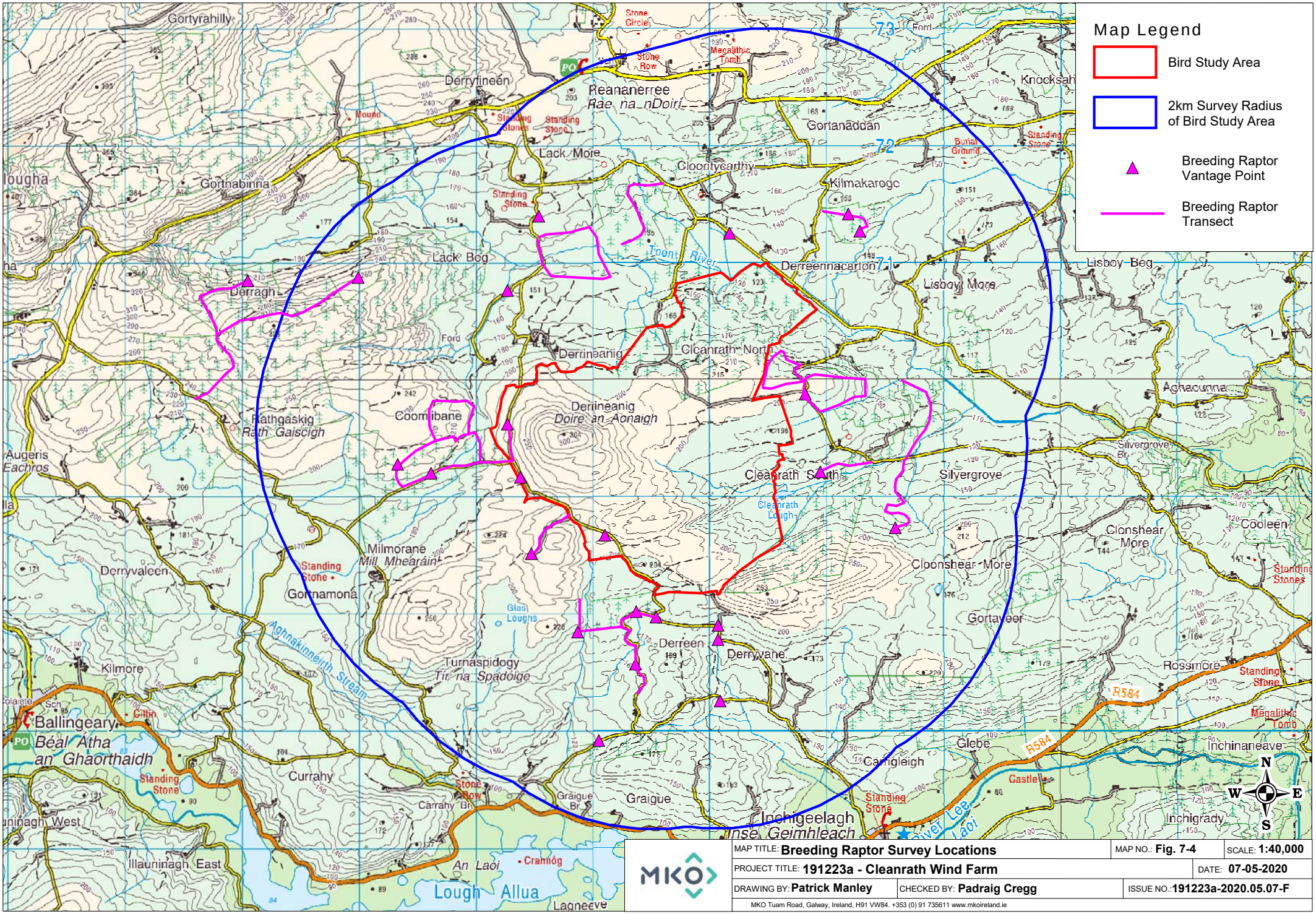

MAP TITLE: **Breeding Raptor Survey Locations**		MAP NO.: **Fig. 7-4**	SCALE: **1:40,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **07-05-2020**
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7.2.4.2.4 Red Grouse Surveys

Red Grouse surveys were conducted during (March) 2015, (March) 2016 and (March) 2017. Methodology 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 area included all areas of suitable breeding habitat within the Cleanrath wind farm development. The survey consisted of tape luring transects. Survey details are provided in Appendix 7-2, Table 9. Figure 7-5 shows the areas surveyed

The work was carried out under NPWS Licence Numbers 034/2015, 002/2016 & 022/2017.

7.2.4.2.5 Hen Harrier Roost Surveys

These surveys were undertaken in areas of suitable roosting habitat to a 2km radius of the Cleanrath wind farm development during the winter season (as per SNH 2017).

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 both non-breeding seasons (November 2015 - March 2016 & Oct 2016 – February 2017). Full details of survey effort are provided in Appendix 7-2 Table 10. Figure 7-6 shows the locations of Hen Harrier Roost Survey VP locations.

7.2.4.2.6 Waterfowl Surveys

Waterfowl surveys were carried out at Lough Allua, approximately 2km south of the Cleanrath wind farm development at its closest point, for waterbird populations (i.e. waders, waterfowl, gulls, grebes and rails) during both winter seasons (November 2015 – March 2016 and August 2016 – February 2017 (as per SNH 2017). The survey methodology employed followed the 'I-WeBS Counter Manual – Guidelines for Irish Wetland Bird Survey Counters' co-ordinated by BirdWatch Ireland. Broadly in accordance with SNH (2017), counts were undertaken monthly during the first winter surveyed and bimonthly during the second winter surveyed, at each target wetland site during the wintering/migratory period. Counts were undertaken during daylight hours (including dawn and dusk) from suitable vantage points at the wetland site.

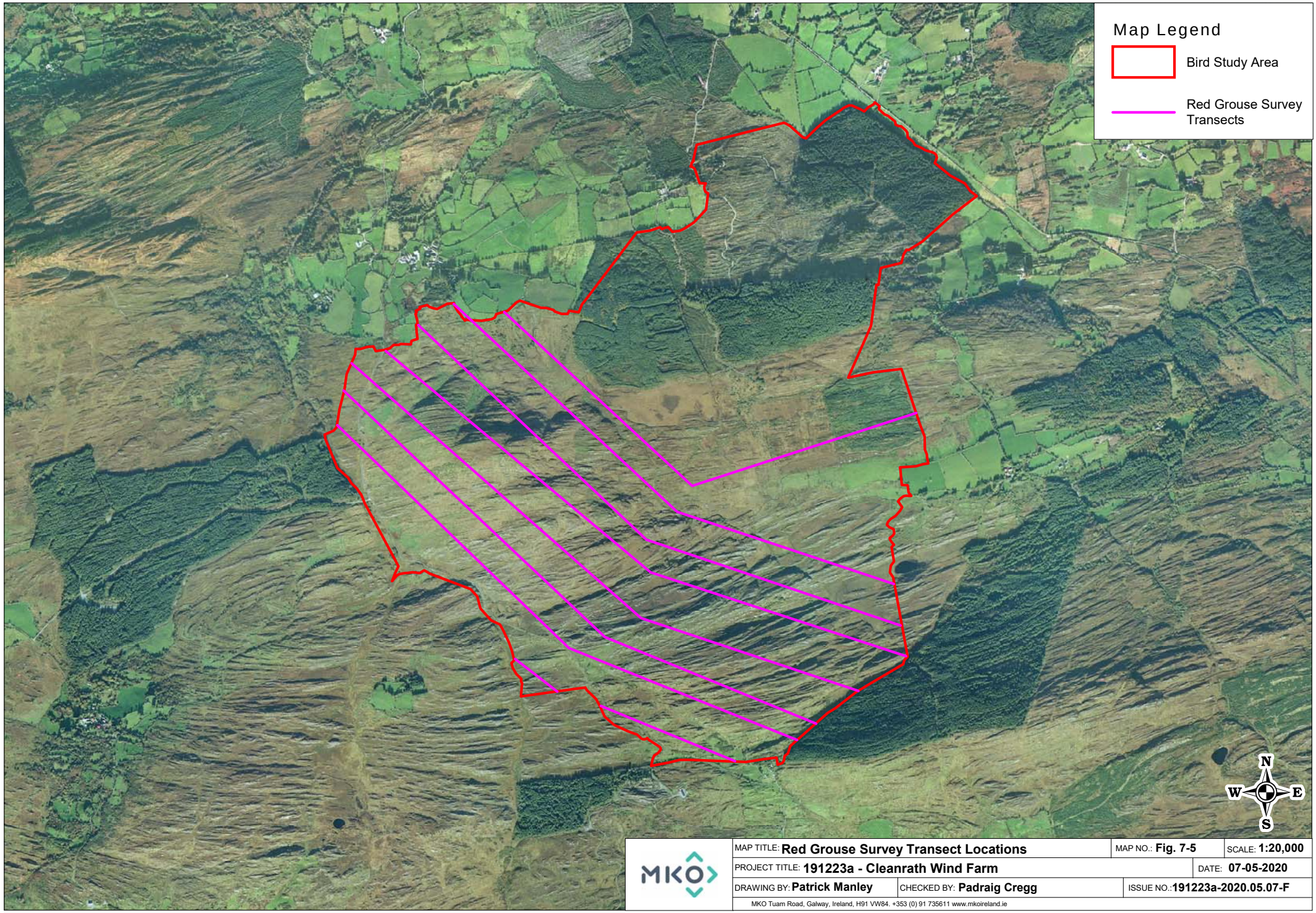
Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-2, Table 12. Figure 7-7 shows the surveyed area.

7.2.4.2.7 Winter Transect Surveys

Winter transect surveys were conducted during the 2016/17 winter season 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. Surveys were conducted monthly between November 2016 and February 2017.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-2, Table 13. Figure 7-8 shows the surveyed area.



MAP TITLE: **Red Grouse Survey Transect Locations**		MAP NO.: **Fig. 7-5**	SCALE: **1:20,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **07-05-2020**
DRAWING BY: **Patrick Manley**	CHECKED BY: **Padraig Cregg**		ISSUE NO.: **191223a-2020.05.07-F**

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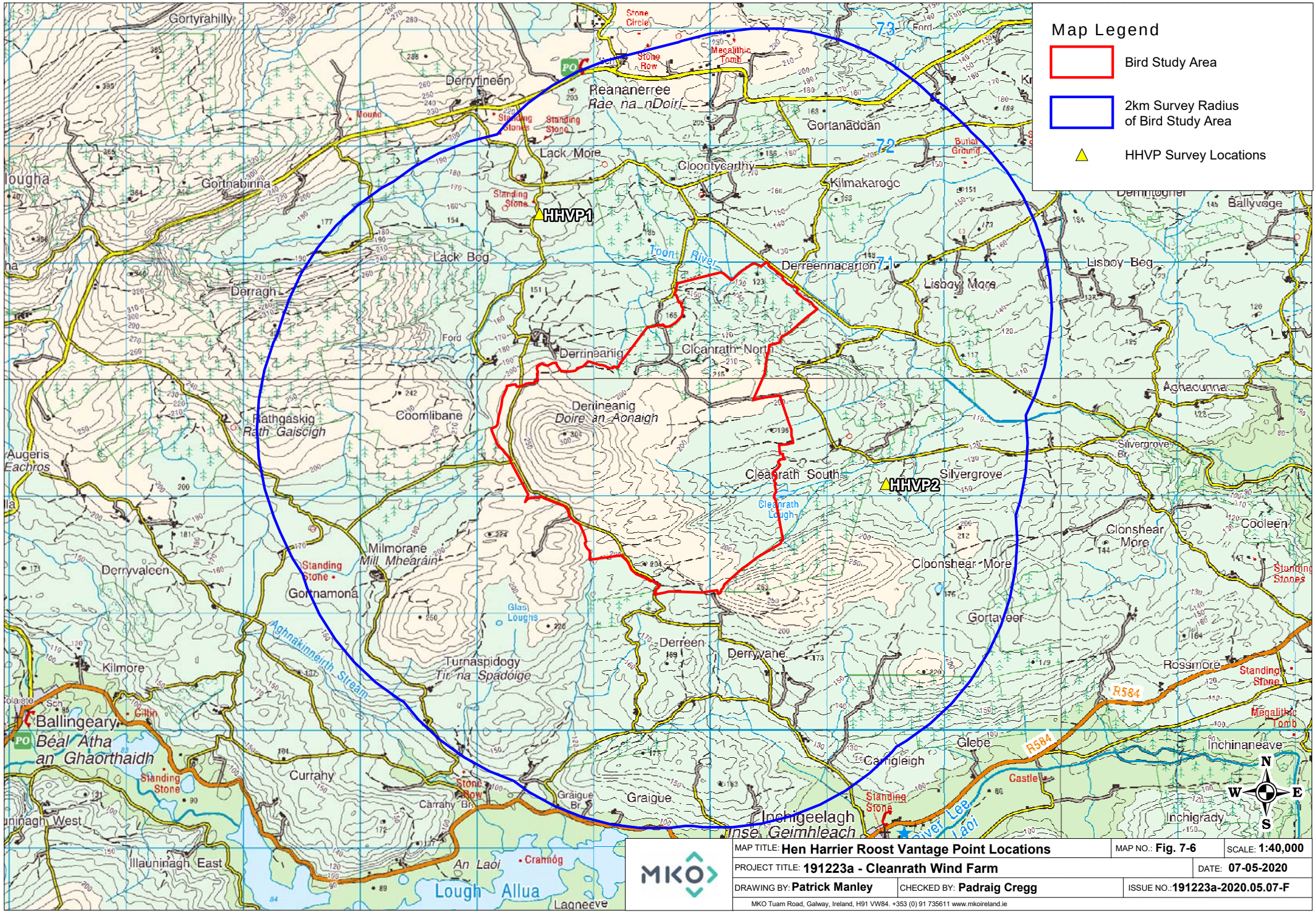

MAP TITLE: **Hen Harrier Roost Vantage Point Locations**		MAP NO.: **Fig. 7-6**	SCALE: **1:40,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **07-05-2020**
DRAWING BY: **Patrick Manley**	CHECKED BY: **Padraig Cregg**	ISSUE NO.: **191223a-2020.05.07-F**	

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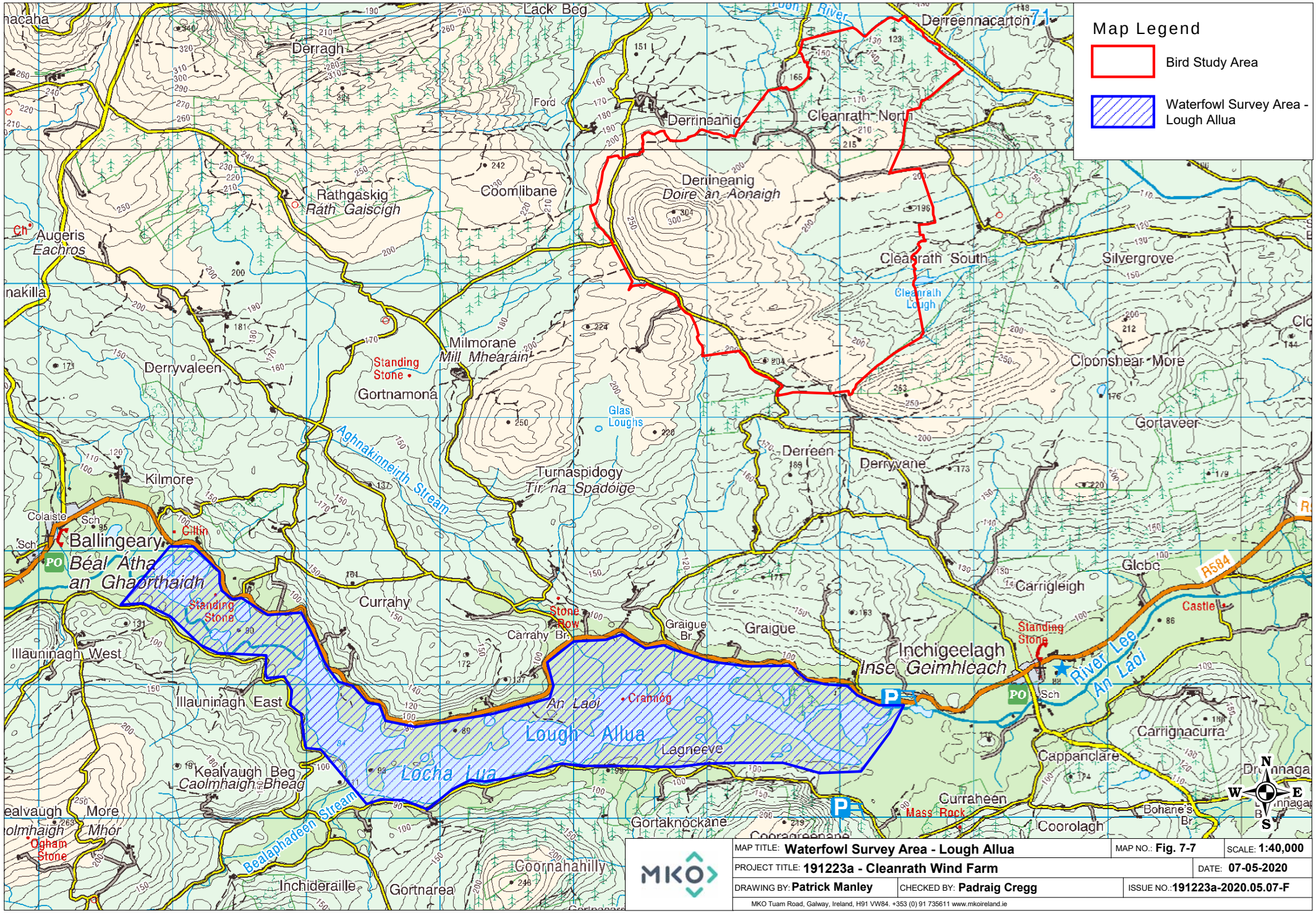

MAP TITLE: **Waterfowl Survey Area - Lough Allua**		MAP NO.: **Fig. 7-7**	SCALE: **1:40,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **07-05-2020**
DRAWING BY: **Patrick Manley**	CHECKED BY: **Padraig Cregg**	ISSUE NO.: **191223a-2020.05.07-F**	

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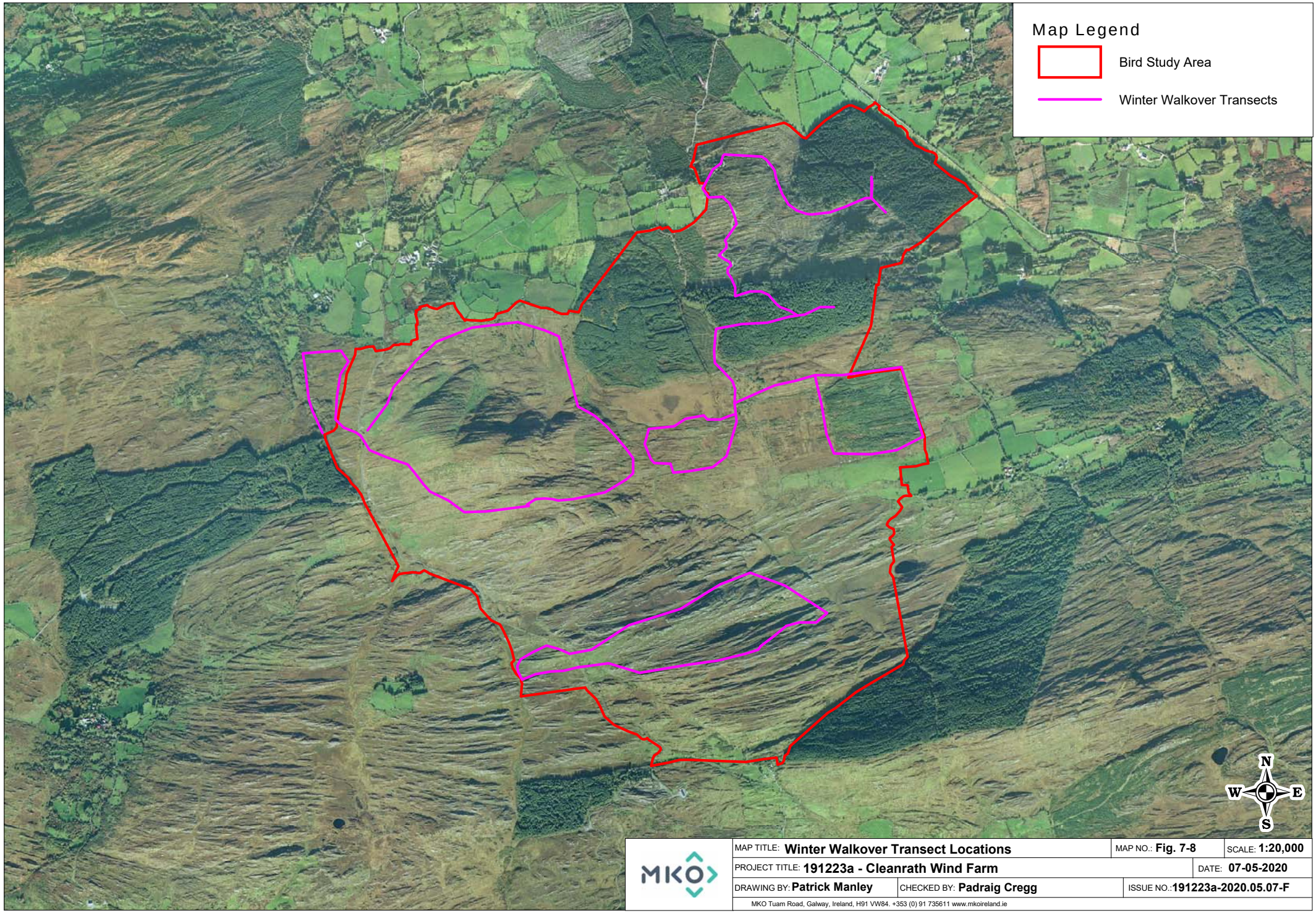

MAP TITLE: **Winter Walkover Transect Locations**		MAP NO.: **Fig. 7-8**	SCALE: **1:20,000**
PROJECT TITLE: **191223a - Cleanrath Wind Farm**			DATE: **07-05-2020**
DRAWING BY: **Patrick Manley**	CHECKED BY: **Padraig Cregg**	ISSUE NO.: **191223a-2020.05.07-F**	

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7.2.4.2.8 Pre-Commencement Monitoring Bird Surveys

Pre-commencement bird surveys were conducted during the 2018 breeding season to determine the presence of bird species of high conservation concern within areas of potential suitable habitat in the study area, particularly breeding raptors, prior to commencement of construction activities. Surveys were carried in compliance with the requirement of Planning Condition 12 of Pl. Ref. No. 15/06966 (ABP Ref. PL 04.246742). The condition states that:

"Pre-construction and post-construction monitoring and reporting programmes for birds (particularly Hen Harrier and Merlin) shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development. The surveys shall be undertaken by suitably qualified and experienced specialists."

Pre-commencement bird surveys were undertaken between June 2018 and August 2018. Survey methodologies consisted of adapted Brown & Shepard walkover surveys within 500m of the Cleanrath wind farm development (see Section 7.2.4.2.2) and Breeding raptor surveys within 2km of the Cleanrath wind farm development (see Section 7.2.4.2.3) with a particular emphasis on hen harrier and merlin. A total of 25 hours and 30 minutes of breeding raptor surveys were carried out between June and August 2018, while a total of 31 hours and 30 minutes of adapted Brown & Shepard walkover surveys were carried out between June and August 2018.

Survey effort, including details of survey duration and weather condition, for Breeding Bird Surveys and Breeding Raptor Surveys is presented in Appendix 7-2, Table 4 and Table 7, respectively. The results of pre-commencement bird monitoring can be seen in Appendix 7-7.

7.2.4.2.9 Operational Monitoring Bird Surveys

Operational monitoring bird surveys were begun in January 2020 when the wind farm went operational and continues at the Cleanrath wind farm development. Surveys consist of Vantage Point Surveys, Breeding Bird Surveys, Breeding Raptor Surveys, Hen Harrier Roost Surveys, Winter Transect Surveys and Corpse Searching Surveys. All of the survey methodologies described below are in line with conditions of the previous planning permission (ABP Ref. PL04.246742) which are currently ongoing at the Cleanrath wind farm development to ensure no lapse in bird surveys. Operational monitoring surveys are in full compliance with SNH (2017) recommended survey methodologies ensuring that the same level of survey effort is continued to allow for a direct comparison of the surveys conducted prior to construction (2015 – 2017). This EIAR only contains Operational Monitoring results up to the end of May 2020. Due to time sensitivity of the application it was not possible to process, digitise and incorporate the results from June and July 2020 in the assessment. June and July surveys have been completed and August operational monitoring has since commenced with the view to continuing surveying up to the time of the board's decision, and beyond should consent be granted, to ensure no lapse in surveys.

Survey effort, including details of survey duration and weather condition, for Operational Bird Monitoring surveys is presented in Appendix 7-2, while survey results can be found in Appendix 7-8.

Vantage Point Surveys

Vantage Point surveys were conducted from two fixed VP locations at the Cleanrath wind farm development. Two rounds of surveys were conducted in February 2020 to account for January and February survey rounds. VP surveys consisted of a minimum of 6 hours per VP each month, culminating in 30 hours of surveys per VP between February and May 2020. Survey methods were in line with SNH (2017) recommendations. Further detail on methodologies can be found in Section 7.2.4.2.1 above.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-2, Table 2. The location of both VPs used and results for operational bird monitoring can be seen in Appendix 7-8.

Breeding Bird Surveys

Breeding Bird surveys were commenced at the Cleanrath wind farm development during the 2020 breeding season as part of the operational bird monitoring programme. Surveys were initially intended to commence in April 2020, however due to travel restriction put in place by the government as a result of the Covid-19 outbreak in Ireland, surveys could not be conducted in April. Surveys therefore commenced in May 2020 as a result. Survey methods were in line with SNH (2017) recommendations. Further detail on methodologies can be found in Section 7.2.4.2.2 above.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-2, Table 5. The results for operational bird monitoring can be seen in Appendix 7-8.

Breeding Raptor Surveys

Breeding Raptor surveys were commenced at the Cleanrath wind farm development during the 2020 breeding season as part of the operational bird monitoring programme. Surveys were initially intended to commence in April 2020, however due to travel restriction put in place by the government as a result of the Covid-19 outbreak in Ireland, surveys could not be conducted in April. Surveys therefore commenced in earlyMay 2020 as a result. Survey methods were in line with SNH (2017) recommendations. Further detail on methodologies can be found in Section 7.2.4.2.3 above.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-2, Table 8. The areas surveyed and results from operational bird monitoring can be seen in Appendix 7-8.

Hen Harrier Roost Surveys

Hen Harrier Roost surveys were conducted in February 2020 from three survey locations overlooking areas of suitable hen harrier roosting habitat within 2km of the Cleanrath wind farm development. Two rounds were undertaken at each survey location during the month of February to account for January surveys. In March 2020 Hen Harrier Roost survey locations were revised to ensure adequate coverage of all suitable hen harrier roosting areas, adding an additional two survey locations. Survey methods are in line with SNH (2017) recommendations. Further detail on methodologies can be found in Section 7.2.4.2.5 above. Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-2, Table 11.

Winter Transect Surveys

Winter Transect surveys were conducted at the Cleanrath wind farm development and within 500m of same between February and March 2020. Two rounds of transect surveys were undertaken during the month of February to account for January surveys. Survey methods were in line with SNH (2017) recommendations. Further detail on methodologies can be found in Section 7.2.4.2.5 above.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-8, Table 14. The results for operational bird monitoring can be seen in Appendix 7-8.

Corpse Searching Surveys

Corpse searching surveys were commenced in January 2020 and are on-going in accordance with the Bird Monitoring Programme (Appendix 7-6). Surveys for bird casualties will follow survey methods broadly based on guidelines issued by the SNH (2009) and search methods adopted by Duffy &

Steward (2008). Searcher efficiency and carcass removal trials were conducted in advance of the commencement of the bird fatality searches to account for ability of the trained search dog to find bird corpses and the effect of scavengers on search results. This allowed for an estimate of the total number of collisions at the wind farm for each survey year.

During each visit, searches are undertaken at each operating turbine location by a team consisting of one surveyor with a trained search dog with a GPS collar attached, so that all finds could be plotted, subject to review by the accompanying surveyor. A plot measuring 130m x 130m from the centre of each turbine location was the subject of target searches for bird casualties. Recording sheets are used to document bird carcasses encountered in the field. The following details are considered during field surveys: GPS location of each bird carcass, photographic record, carcass condition (intact (carcass that is completely intact or not badly decomposed), scavenged (evidence that the carcass was fed upon by a scavenger/predator) or feather patch (ten or more feathers indicating predation or scavenging or two or more primary feathers must be present to consider the carcass a casualty)), distance from the turbine location, date, time, etc. Results of bird casualties will be issued in a final report at the end of each monitoring year.

7.2.4.2.10 2011/12 Winter Bird Surveys

Vantage Point (VP) Surveys were carried out during the 2011/12 winter season to cover the range of bird species of conservation importance that could potentially occur on, or fly over, the main study area. The VP survey methodology was based on Survey methods for use in assessing the impacts of onshore windfarms on bird communities (SNH, 2014), with monthly VP watches carried out throughout 2011/12 from three fixed survey locations (VPA, VPB and VPC). Surveys were carried out between October 2011 and March 2012 covering the full winter season. Each VP was subject to a three-hour survey per month, giving a total survey effort of 18 hours per VP across the winter season.

Watches were carried out only in weather conditions that were considered to be acceptable for vantage point surveying. Acceptable conditions were defined as winds not exceeding force five on the Beaufort Scale in strength and good visibility of at least 1.5 to 2 kilometres from the vantage point. Heavy and persistent rain/hail or snow (i.e. heavy enough to discourage bird activity) were considered to render conditions unsuitable for surveying, although light-moderate passing showers or short periods of fine drizzle were considered acceptable as long as they did not have significant negative effects on visibility. Watches could be suspended and restarted where weather conditions were changeable between acceptable and unacceptable for surveying (e.g. a watch could be suspended during a sudden torrential downpour, or where a mist rose and cleared again); the period of suspension would not count towards the total required watch time. Observations did not begin for five minutes (to allow any short-term disturbance to decline) after reaching a VP at the beginning of a survey day and a break of 20 minutes between any two consecutive VP watches was also enforced.

The direction of flight, the height (or altitude) of flight and the time for which the bird(s) was in view were pieces of data that were recorded for each sighting during the vantage point watches. The height estimates that were made by the observer during the survey were used to separate the observations into broad altitude groups, i.e. observations of birds flying at heights of less than ten metres, observations of birds flying at heights between ten and 100 metres and observations of birds that were flying at heights greater than 100 metres.

For details on results of the 2011/12 bird surveys see Section 7.3.6 below.

7.2.5 Ornithological Evaluation Criteria and Impact Assessment Methodology

7.2.5.1 Potential Effects Associated with Cleanrath Wind Farm 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 (which has been obtained through the surveys outlined in Section 7.2.4) has been utilised to predict the potential significant effects of the Cleanrath wind farm development on birds. Potential significant effects will be 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

The Guidelines for Ecological Impact Assessment (EcIA) (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.

Sensitivity	Determining Factor
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 chough. Species present in nationally important numbers (>1% Irish population)
Medium	Species on Annex I 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)

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

Table 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)

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

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 7-5 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 Cleanrath wind farm development between February 2015 and March 2017.

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, with supplementary data from pre-commencement surveys (2018) and operational monitoring (2020) also included in the assessment process.

The surveys undertaken provide the information necessary to allow a complete, comprehensive and robust assessment of the potential impacts of the Cleanrath wind farm development on avian receptors.

7.2.6.1 Mitigation

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

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 mitigation measures applied during the construction phase of the Cleanrath wind farm development were in line with the CEMP provided in Appendix 4-4.

The potential significant effects of the Cleanrath wind farm 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.

7.2.6.2 Limitations

The information provided in this rEIAR chapter accurately and comprehensively describes the baseline environment; provides an accurate prediction of the likely effects of the Cleanrath wind farm development; prescribes and implements mitigation as necessary; and describes the predicted and observed residual impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines. No difficulties (for example technical deficiencies or lack of knowledge) were encountered while compiling the required information. No significant limitations in the scope, scale or context of the assessment have been identified.

7.3 Baseline Conditions and Receptor Evaluation

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

The potential for the development to have impacted on sites that are designated for nature conservation was considered in this remedial Ecological Impact Assessment.

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are designated under EU Habitats Directive and are collectively known as 'European Sites'. The potential for effects on European Sites is fully considered in the remedial Natura Impact Statement (rNIS) that accompanies this application.

Natural Heritage Areas (NHAs) are designated under Section 18 of the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. The potential for effects on these designated sites is fully considered in Chapter 6 of this rEIAR.

Proposed Natural Heritage Areas (pNHAs) were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. However, the potential for effects on these designated sites is fully considered in Chapter 6 of this rEIAR.

The following methodology was used to establish which sites, that are designated for nature conservation, with the potential to be impacted by the Cleanrath wind farm development:

- Initially the most up to date GIS spatial datasets for European designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 26/05/2020. The datasets were utilized to identify Designated Sites which could feasibly have been affected by the development.
- All Designated Sites within a distance of 15km surrounding the development site were identified. In addition, the potential for connectivity with European Sites at distances of greater than 15km from the development was also considered in this initial assessment. In this case, no potential connectivity with sites located at a distance of over 15km from the development was identified.
- Catchment mapping was used to establish or discount potential hydrological connectivity between the site of the development and any Designated Sites.
- The results of the extensive bird surveys carried out in advance of the construction between February 2015 and March 2017 was consulted in the course of this screening exercise and provided information on whether the birds recorded on the site could potentially be associated with any European Site. Additional pre-commencement and operational bird survey results from 2018 and 2020 were also considered.
- Table 7-8, provides details of all relevant Designated Sites as identified in the preceding steps and assesses which are within the likely Zone of Impact.
- The site synopses and conservation objectives of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report.
- Where potential pathways for Significant Effect are identified, the site is included within the Likely Zone of Impact and further assessment is required.

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 Cleanrath wind farm 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. SPAs located within the Likely Zone of Influence of the development are listed below in Table 7-8 and illustrated on Figure 6-3 in Chapter 6.

Table 7-8 Designated Sites in the Zone of Influence

Special Protection Areas and distance from Cleanrath wind farm development	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (https://www.npws.ie, 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
Mullaghanish to Musheramore Mountains SPA (004162) **Distance:** 4.7km from Wind farm site 8.3km from Grid Connection Route	› Hen Harrier *(Circus cyaneus)* [A082]	This site has the generic conservation objective: "To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA." (NPWS (2020) Generic Version 7.0)	There have been/will be no direct effects as the development is located entirely outside and 4.7km from the designated site. There can be no direct effects into the future as no pathway for such effects exists. The development lies outside the 2km core foraging range for the SCI species hen harrier as per Scottish Natural Heritage guidance (2016). However, the species was recorded on the site during the extensive bird surveys undertaken. No breeding activity was recorded and all except two observations over a five-year survey period (2015 -2020) occurred during winter months. Hen harrier is identified as a Key Ornithological Receptor of high sensitivity and following a precautionary approach, individuals recorded could potentially be associated with the population within the SPA and further assessment of the effects that may occur or have occurred on this species is required. Consequently, the potential for significant indirect effects on this European Site cannot be excluded. This site is considered to be within the Likely Zone of Impact. **It cannot be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, will not have, or has not had, a significant effect on this European site. Accordingly, a Stage Two Appropriate Assessment is required.**
The Gearagh SPA (004109)	› Wigeon *(Anas penelope)* [A050] › Teal *(Anas creca)* [A052]	This site has the generic conservation objective:	There have been/will be no direct effects as the development is located entirely outside and approximately 7.6km from the designated

Special Protection Areas and distance from Cleanrath wind farm development	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (https://www.npws.ie, 17/06/2020)	Conservation Objectives	Likely Zone of Impact Determination
Distance: 7.6km by land & 9.3km via surface water from Wind farm site 10.1km from Grid Connection Route	› Mallard *(Anas platyrhynchos)* [A053] › Coot *(Fulica atra)* [A125] › Wetland and Waterbirds [A999]	"To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA." This site also has a second conservation objective: "To maintain or restore the favourable conservation condition of the wetland habitat at The Gearagh SPA as a resource for the regularly-occurring migratory waterbirds that utilise it." (NPWS (2020) Generic Version 7.0)	site. There can be no direct effects into the future as no pathway for such effects exists. The development site does not provide significant supporting habitat for any of the SCI species for which the SPA is designated. None of the SCI species were assigned as Key Ornithological Receptors during the extensive bird surveys that were undertaken on the site. Therefore, no potential for indirect impacts on the SPA population to occur, or have occurred, as a result of disturbance/ displacement or collision risk were identified. This SPA is located hydrologically downstream of the development via the River Toon which runs through the development site and via the River Lee, which is located downstream of the development site. Therefore, taking a precautionary approach, a potential pathway for indirect effects on supporting wetland and Waterbird [A999] habitat to occur or have occurred, in the form of deterioration of surface water quality resulting from pollution, associated with the development was identified. Consequently, the potential for significant indirect effects on this European Site cannot be excluded. This site is considered to be within the Likely Zone of Impact. **It cannot be excluded, on the basis of objective information, that the Cleanrath wind farm development, individually or in combination with other plans or projects, will not have or has not had a significant effect on this European site. Accordingly, a Stage Two Appropriate Assessment is required.**

7.3.2 Breeding and Wintering Bird Atlas Records

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

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

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

The core study area lies within hectads W16, W26 and W27.

Table 7-9 presents a list of species of conservation interest recorded from the relevant hectads during previous breeding atlases:

Table 7-9 Breeding Bird Atlas Data (Hectads W16, W26 and W27)

Species Name	Breeding Atlas 68-72			Breeding Atlas 88-91			Breeding Atlas 07-11			Conservation Status
	W16	W26	W27	W16	W26	W27	W16	W26	W27	
Hen Harrier *(Circus cyaneus)*	-	-	-	-	-	-	Poss	-	-	BD
Corncrake *(Crex crex)*	Prob	Prob	Prob	-	-	-	-	-	-	BD, RL
Peregrine *(Falco peregrinus)*	-	-	-	-	-	-	Poss	-	-	BD
Kingfisher *(Alcedo atthis)*	-	-	-	-	-	-	-	-	Conf	BD
Little Egret *(Egretta garzetta)*	-	-	-	-	-	-	-	-	Poss	BD
Barn Owl *(Tyto alba)*	-	-	-	-	-	-	-	Poss	Poss	RL
Tufted Duck *(Aythya fuligula)*	Conf	-	-	-	-	-	-	-	-	RL
Red Grouse *(Lagopus lagopus)*	Poss	-	-	-	-	-	-	-	-	RL
Lapwing *(Vanellus vanellus)*	Prob	Conf	-	-	Seen	-	-	-	-	RL
Curlew *(Numenius arquata)*	Conf	Conf	Conf	-	-	Seen	-	-	-	RL
Black-headed Gull *(Larus ridibundus)*	Conf	Conf	-	Breed	-	-	Non-B	-	-	RL
Meadow Pipit *(Anthus pratensis)*	Conf	Conf	Conf	Breed	Breed	Seen	Conf	-	Conf	RL
Grey Wagtail *(Motacilla cinerea)*	Conf	Conf	Conf	Breed	Seen	Seen	Poss	Prob	Conf	RL
Yellowhammer *(Emberiza cintrinella)*	Conf	Conf	Conf	Breed	Breed	-	-	-	-	RL

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

Five species listed in Annex I of the EU Birds Directive have been recorded within the relevant ten-kilometre squares during surveys for past breeding bird atlases. Nine bird species have been recorded during past breeding bird atlas surveys which are listed on the BoCCI Red List.

Error! Reference source not found. shows those species recorded in the relevant hectads (W16, W26 and W27) 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 (Hectads W16, W26 and W27)

Species Name	Wintering Atlas 81-84			Wintering Atlas 07-11			Conservation Status
	W16	W26	W27	W16	W26	W27	
Chough *(Pyrrhocorax pyrrhocorax)*	-	-	-	Pres	-	-	BD
Whooper Swan *(Cygnus cygnus)*	-	Pres	-	Pres	Pres	Pres	BD
Hen Harrier *(Circus cyaneus)*	-	Pres	-	-	Pres	-	BD
Merlin *(Falco columbarius)*	-	Pres	-	-	-	Pres	BD
Peregrine *(Falco peregrinus)*	-	-	-	-	-	Pres	BD
Kingfisher *(Alcedo atthis)*	-	Pres	Pres	Pres	Pres	Pres	BD
Little Egret *(Egretta garzetta)*	-	-	-	-	Pres	Pres	BD
Golden Plover *(Pluvialis apricaria)*	-	Pres	-	-	Pres	-	BD, RL
Barn Owl *(Tyto alba)*	-	-	-	-	Pres	-	RL
Woodcock *(Scolopax rusticola)*	Pres	Pres	Pres	Pres	Pres	Pres	RL
Pochard *(Aythya ferina)*	Pres	-	-	-	-	-	RL
Tufted Duck *(Aythya fuligula)*	Pres	Pres	-	-	Pres	-	RL
Wigeon *(Anas penelope)*	Pres	-	-	Pres	Pres	-	RL
Goldeneye *(Bucephala clangula)*	Pres	Pres	-	-	Pres	-	RL
Lapwing *(Vanellus vanellus)*	Pres	Pres	Pres	-	Pres	-	RL
Curlew *(Numenius arquata)*	Pres	Pres	Pres	-	Pres	-	RL
Black-headed Gull *(Larus ridibundus)*	Pres	Pres	Pres	-	Pres	Pres	RL
Meadow Pipit *(Anthus pratensis)*	Pres	Pres	Pres	Pres	Pres	Pres	RL
Grey Wagtail *(Motacilla cinerea)*	Pres	Pres	Pres	Pres	Pres	Pres	RL
Herring Gull *(Larus argentatus)*	-	Pres	Pres	-	-	Pres	RL

Species Name	Wintering Atlas 81-84			Wintering Atlas 07-11			Conservation Status
	W16	W26	W27	W16	W26	W27	
Yellowhammer *(Emberiza cintrinella)*	-	Pres	Pres	-	-	-	RL

BD = EU Birds Directive Annex I; RL = BoCCI Red List; Pres = present in hectad; - = not recorded

Eight species listed in Annex I of the EU Birds Directive have been recorded within the relevant ten-kilometre squares during surveys for past wintering bird atlases: A further thirteen bird species have been recorded during past wintering bird atlas surveys which are listed on the BoCCI Red List.

7.3.3 Bird Sensitivity Mapping Tool

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

There is no data available for the majority of the Cleanrath wind farm development, while a small section to the south adjacent to existing infrastructure is located within a *Low* bird sensitivity zone. These areas were surveyed as part of the suite of previously described surveys.

7.3.4 Irish Wetland Bird Survey (I-WeBS) Records

The study area is not covered by an I-WeBS site and the nearest site (Inishcarra Reservoirs) is located approximately 10km to the east of the Cleanrath wind farm development boundary. Data from I-WeBS sites in County Cork has been used to estimate wintering populations of waterbirds identified as KORs. Datasets for the following sites were downloaded from www.birdwatchireland.ie and reviewed:

Cork IWeBS Sites

- Adrigole Harbour
- Argideen River
- Ballin Lough
- Ballybranagan
- Ballybutler Lake
- Ballycotton Shanagarry
- Ballycrenane/Warren
- Ballydehob Estuary
- Ballyhea Gravel Pit
- Ballyhonock Lough
- Ballymacoda
- Ballynacarriga Lake
- Bandon Estuary
- Bandon River
- Bantry Bay
- Barely Cove Bay
- Bear Haven
- Blackwater Valley
- Blarney Fen - Clogheenmilcon
- Blarney Lake
- Carrigillihy Lake

- Castlemartyr Lake
- Castlenalact Lake
- Charleville Lagoons
- Classes Lakes/Gravel Pits
- Clonakility Bay
- Cloonties Lake
- Cork Harbour
- Corran Lake
- Courtmacsherry Bay, Broadstrand Bay & Dunworley
- Croagh Bay
- Crookhaven
- Curraghlicky Lake
- Gallanes Lough, Clonakility
- Garryhesta Gravel Pit
- Glandore Harbour/Union Hall
- Ilen Estuary
- Inishcarra Reservoirs
- Kilcolman Marsh
- Kilkern Lake
- Lissagriffin Lake
- Lough Aderry
- Lough Atarriff
- Lough Cluhir
- Lough Gorm
- Madame Lake (Batemans Lough)
- Mahona Lough
- Myross Island &Inlet
- Nohoval Lake
- Ringabella Creek
- Roaringwater Bay
- Rosbrin Cove
- Rosscarbery
- Sherkin Island
- Shreeland Lakes
- Stick Estuary
- Toormore Bay

7.3.5 NPWS Rare and Protected Species Dataset

An information request was sent to the NPWS requesting bird records from the Rare and Protected Species Database on the 28th of April 2020. A response was received on the 6th of May 2020 from the NPWS, stating that they do not hold any sensitive bird records for the study area and the surrounding areas.

7.3.6 2011/12 Ornithological Surveys

Bird surveys were carried out as part of a previous windfarm application (Pl. Ref No. 15/6966) for the Cleanrath wind farm development between October 2011 and March 2012. For details on survey methods see Section 7.2.4.10 above. Survey results are summarised below.

Hen Harrier

There was a single observation of a female hen harrier om the 29th of March 2012, as the bird was seen soaring over the development site.

Merlin

There was a single observation of a merlin as an individual was seen in flight on the 20th of October 2011 before landing for a brief period on top of the hill near the VP.

Peregrine

Peregrine were recorded on two occasions during the 2011/12 winter season. An individual bird was seen in flight on two occasions during surveys at VPA, one of which occurred on the 5th of December 2011, while the other occurred on the 23rd of January 2012.

Golden Plover

Golden plover were recorded on a number of occasions during the 2011/12 winter season.

7.4 Field Survey Results 2015-2017

A comprehensive list of all bird species recorded within the Cleanrath wind farm development during surveys is provided in Table 2 of Appendix 7-1. The target species listed below were recorded within the zone of influence of the Cleanrath wind farm development during the ornithological surveys between 2015 and 2020. 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, SCI of Mullaghanish to Musheramore Mountains SPA)
- Chough (Annex I species)
- Merlin (Annex I species)
- White-tailed Eagle (Annex I species)
- Peregrine (Annex I species)
- Little Egret (Annex I species)
- Wigeon (Red listed with regard to Wintering populations)
- Woodcock (Red listed with regard to Breeding populations)
- Kestrel (Raptor, Schedule IV of the Wildlife Act; 1976)
- Sparrowhawk (Raptor, Schedule IV of the Wildlife Act; 1976)
- Buzzard (Raptor, Schedule IV of the Wildlife Act; 1976)
- Snipe (Amber listed with regard to Breeding and Wintering populations)
- Meadow Pipit (Red listed with regard to Breeding populations)

The following sections describe the observations of each target species under the individual survey headings. Survey data and mapping for each target species recorded between 2015 and 2017 is provided in the technical appendices (Appendices 7-2 to 7-4). 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 (VPs).
- Summary of observations at Potential Collision Height for target species during VPs.
- Summary of the monthly distribution of flight activity recorded for the non-target species during VPs.
- 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 target species distribution during Winter Transect Surveys.
- Summary of monthly distribution of species recorded during Waterfowl Surveys.

7.4.1 Whooper Swan

Raw Survey data for whooper swan is provided in Appendix 7-4. Results summary tables are presented in Appendix 7-3.

Waterfowl Surveys

Whooper swan were recorded on 13 occasions during Waterfowl Surveys at Lough Allua, approximately 2km to the south of the Cleanrath wind farm development (see Figure 7-7). Numbers recorded ranged from a pair of swans to a maximum flock of 13 birds. Eight observations occurred during the 2015/16 winter season surveys, between the 9th of December 2015 and 9th of February 2016.

The remaining five observations occurred during the 2016/17 winter season, between the 14th of December 2016 and 23rd of February 2017.

Nine observations related to birds feeding and loafing in areas of agricultural grassland surrounding Lough Allua, while the remaining four observations consisted of flocks of 2 – 3 birds seen in flight in the vicinity of Lough Allua.

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

7.4.2 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 in flight on 31 occasions during Vantage Point Surveys (see Appendix 7-4, Figure 7.1.1). Twenty-three of the 31 flights occurred within the height band 10-175m (i.e. Potential Collision Height (PCH) for Collision Risk Modelling (CRM) purposes). All observations of golden plover occurred during the winter months or periods of migration (November – April). There was only one observation of golden plover during April, on this occasion a flock of 29 birds were observed on the 7th of April 2016. This observation was likely to be from a lingering wintering population.

Four flights occurred between the 21st and 22nd of March 2015, on this occasion a small flock was seen flying around the site and roosting/loafing around the high point on-site near VP1. Flock sizes in March 2015 ranged from 26 to 40 birds. Nineteen of the 31 flights were recorded during the 2015/2016 winter season (November – April), while the remaining eight observations occurred during the 2018/2019 winter season (November – February). Observations ranged from individuals to a maximum flock of 52 birds. Golden plover flight activity was predominantly associated with an elevated area around VP1 and VP2 where small flocks of golden plover were roosting and loafing (See Appendix 7-4, Figure 7.1.1).

Breeding Bird Surveys

Golden plover were only recorded on one occasion during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.1). On the 23rd of May 2016 a flock of 21 golden plover were heard calling and seen in flight to the north of the Cleanrath wind farm development, more than 500m from the nearest turbine. No evidence of breeding activity was recorded. This observation is likely to be associated with a lingering wintering population, due to the nature of observation and the breeding distribution of golden plover in Ireland (i.e. only occurring north of Galway Bay).

Winter Transect Surveys

Golden plover were only recorded on four occasions during Winter Transect Surveys (see Appendix 7-4, Figure 7.8.2). Observations ranged between flocks of four and twelve birds. All four observations occurred onsite and within 500m of turbines. All observations occurred between December 2016 and February 2017.

Incidental Observations

There were four incidental observations of golden plover between February 2015 and March 2017, all four of which occurred during dedicated Red Grouse Surveys. On the 27th of March 2015 a flock of six golden plover were observed, while on the 24th of March 2016 a flock of four birds were flushed from an area within the Cleanrath wind farm development. The remaining two observations both occurred

on the 22nd of March 2017 when a flock of ten birds and a flock of 32 birds were observed during the same survey.

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

7.4.3 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 fourteen occasions during Vantage Point Surveys between February 2015 and February 2017 (see Appendix 7-4, Figure 7.1.2). All fourteen observations occurred during winter months between September and February. Only five of the fourteen observations occurred within, or partially within, the height band considered for PCH. All fourteen observations occurred within the Cleanrath wind farm development, predominantly within the north-western section of the site. All observations were of individual birds in hunting or travelling flights. There was no evidence of breeding or roosting activity observed.

Four observations were recorded during February 2015 between the 21st and 22nd. Each of the four observation were of an individual male in flight. Three observations occurred during the 2015/16 winter season. Each observation consisted of individuals in flight between September and October 2015. The remaining seven observations were recorded during the 2016/17 winter season, between December 2016 and January 2017. Five of the seven observations occurred during December while the remaining two observations occurred on the 13th of January 2017.

Breeding Bird Surveys

Hen harrier were only recorded on one date during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.2). On the 15th of April 2015 two hen harrier were recorded in separate flights. One individual was flying directly over the site, while the other was seen offsite to the north from the Cleanrath wind farm development. No evidence of breeding activity was observed.

Hen Harrier Roost Surveys

Hen harrier were only recorded twice during dedicated Hen Harrier Roost Surveys (see Appendix 7-4, Figure 7.6.1). Both observations occurred on the 21st of November 2016 as an individual was observed in flight on two occasions within a fifteen-minute period before dusk. Both observations consisted of individuals in flight, between one and two kilometres to the east of the Cleanrath wind farm development, with no evidence of roosting behaviour recorded.

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

7.4.4 Chough

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

Breeding Bird Surveys

Chough were only recorded on two separate dates during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.3). All observations of chough occurred on the northern and southern perimeters of the

Cleanrath wind farm development. On the 17th of September 2015 chough were recorded on five occasions within a one-hour period, with a maximum of three individuals seen at any one time interacting with one another. On the 28th of July 2016 a small flock of seven chough were seen circling and calling for an extended period over an area of farmland, approximately 150m to the north of the Cleanrath wind farm development.

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

7.4.5 Merlin

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

Breeding Raptor Surveys

Merlin were only recorded twice during Breeding Raptor Surveys (see Appendix 7-4, Figure 7.4.1). Both observations occurred on the 14th of July 2015, consisting of an individual seen on two occasions along the edge of a conifer plantation, directly adjacent to the western boundary of the Cleanrath wind farm development. No evidence of breeding activity was observed.

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

7.4.6 Peregrine

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

Vantage Point Surveys

Peregrine were recorded in flight on four occasions during Vantage Point Surveys (see Figure 7.1.3, Appendix 7-4). All four observations consisted of individual birds seen in flight, three of which occurred within, or partially within, the height band considered for PCH. One observation occurred during the breeding season when a female peregrine was observed in flight on the 26th of August 2015. No evidence of breeding activity was observed. The remaining three observations occurred during the non-breeding season. One observation occurred on the 8th of December 2015 while the other two observations occurred on the 24th of November 2016 on this occasion a male was noted on two occasions. All four observations occurred onsite and within 500m of the turbine layout.

Breeding Raptor Surveys

Peregrine were only recorded once during Breeding Bird Surveys (see Appendix 7-4, Figure 7.4.2). An individual male was recorded circling over an area approximately one kilometre to the east of the Cleanrath wind farm development a number of times before travelling southeast and away from the site. No suitable nesting habitat was identified within the 2km survey radius, e.g. cliffs, quarries, or derelict castles.

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

7.4.7 Wigeon

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

Breeding Bird Surveys

Wigeon were only recorded once during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.4). On the 15th of April 2015 a male and female were disturbed from an area of blanket bog within the Cleanrath wind farm development. While this pair were recorded in potentially suitable breeding habitat, wigeon were not subsequently recorded in this location during the remainder of this or the following breeding season.

Waterfowl Surveys

Wigeon were recorded on eleven occasions during Waterfowl Surveys at Lough Allua, approximately 2km to the south of the Cleanrath wind farm development (see Figure 7-7). Numbers recorded ranged from a pair of birds to a maximum flock of eight. Five observations occurred between the 26th and 27th of November 2015. On these occasions numbers ranged from a pair to a flock of six birds feeding and loafing around Lough Allua. The remaining six observations all occurred during the 2016/17 winter season between August 2016 and February 2017.

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

7.4.8 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 on two occasions during Vantage Point Surveys between February 2015 and February 2017 (see Appendix 7-4, Figure 7.1.4). On the 28th of November 2016 an individual woodcock was seen in a brief flight approximately 500m south of the turbine layout, while on the 20th of December 2016 an individual was flushed as the surveyor walked to the VP.

Winter Transect Surveys

Woodcock were only recorded on one occasion during Winter Transect Surveys. On the 21st of February 2017 an individual woodcock was flushed near a road before flying into cover of forestry.

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

7.4.9 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 recorded in flight on 72 occasions during Vantage Point Surveys (see Figure 7.1.5, Appendix 7-4). Sixty-nine of these observations consisted of individual birds while, three observations consisted of a pair of juvenile birds seen together on three separate occasions late in the 2016 breeding season. Twenty observations occurred during the 2015 core breeding season months between April and August, while there were an additional twelve observations of kestrel during September 2015. There were seven observations of kestrel during the 2015/16 non-breeding season between the months of October and January.

There were twenty observations of kestrel during the 2016 core breeding season months (April – August). Finally, there were thirteen observations during the 2016/17 non-breeding season, between the months of September 2016 and February 2017.

Thirty-one of the 72 observations occurred within, or partially within, the height band considered for PCH.

The observations of juvenile birds observed together late in the 2016 breeding season, as discussed above, is indicative that kestrel bred locally. Furthermore, there were four observations of kestrel heard calling from an area conifer plantation, within the north-eastern section of the Cleanrath wind farm development, during the 2016 breeding season between the months of July and August. This behaviour is indicative of probable breeding in the area.

Breeding Bird Surveys

Kestrel were recorded on 38 occasions during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.5). There were fourteen observations from the 2015 breeding season, between April and September while there were 24 observations of kestrel during 2016 Breeding Bird Surveys between April and August.

All fourteen observations from the 2015 Breeding Bird Surveys consisted of individual birds in flight. On the 16th of June 2015 a female kestrel was recorded carrying food while in flight over the Cleanrath wind farm development. This observation confirms breeding within the area. Furthermore, there were four observations of juvenile kestrel in flight on the 17th of September 2015 which indicates that the breeding was successful.

On the 26th of June 2016 a juvenile was seen perched and attempting to hover. This observation is indicative of successful breeding in the area with a nest likely to be nearby. On the 30th of June two kestrels, an adult male and juvenile, were seen together, with the male hunting while the juvenile was perched nearby. On the 18th of July 2016 there were several observations of adults and juveniles heard calling as well as a juvenile seen circling over an area believed to be a possible nest site. The location of the 2015 and 2016 breeding territories are provided in Figure 7.3.5.1, Appendix 7-4.

Breeding Raptor Surveys

Kestrel were recorded on ten occasions during Breeding Raptor Surveys (see Appendix 7-4, Figure 7.4.3). All ten observations consisted of individual birds seen in flight during the 2016 breeding season, between June and July. All ten observations occurred off-site, predominantly over an area of conifer plantation between 500m and one kilometre to the west of the site. On the 7th of July a male kestrel was observed circling and calling over an area of conifer plantation approximately 3km northwest of the Cleanrath wind farm development. This observation indicates a possible breeding territory in the area. The location of this breeding territory is provided in Figure 7.4.3.1, Appendix 7-4.

Winter Transect Surveys

Kestrel were recorded on six occasions during Winter Transect Surveys (see Appendix 7.4, Figure 7.8.2). Observations occurred between November 2016 and February 2017, as individual birds were observed in hunting/travelling flights. Two observations occurred within the Cleanrath wind farm development while the remaining observations occurred outside the Cleanrath wind farm development.

Incidental Observations

There were two incidental observations of kestrel during a dedicated Red Grouse Survey on the 24th of March 2016. Both observations consisted of individual birds seen in hunting flights.

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

7.4.10 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 recorded on six occasions during Vantage Point Surveys (see Figure 7.1.6, Appendix 7-4). All six observations consisted of individual birds seen in hunting flights. Five of the six observations occurred during the 2015 breeding season, between April and July 2015. No evidence of breeding behaviour was observed. The remaining observation occurred on the 29th of October 2015. Only one of the six observation occurred within, or partially within the height band considered for PCH.

Breeding Bird Surveys

Sparrowhawk were recorded on eleven occasions during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.6). There were six observations from the 2015 breeding season between June and September 2015, while there were five observations of sparrowhawk during 2016 Breeding Bird Surveys between April and July 2016.

On the 28th of July 2016 a group of three juvenile sparrowhawks were heard calling and seen several times from an area of dense conifer plantation to the southeast of the Cleanrath wind farm development. This indicated that there is a nest in the area. The location of this nest can be seen in Figure 7.3.6.1, Appendix 7-4.

The remaining twelve observations consisted of individuals observed hunting. There was no evidence of breeding activity recorded during the 2015 breeding season.

Breeding Raptor Surveys

Sparrowhawk were recorded on six occasions during Breeding Raptor Surveys (see Appendix 7-4, Figure 7.4.4). All six observations consisted of individual birds seen in flight during the 2016 breeding season, between May and July. Two observations consisted of birds which were heard calling from woodland but with no visual observations, while the other four observations were of individuals seen in flight with no evidence of breeding behaviour.

Winter Transect Surveys

Sparrowhawk were recorded on five occasions during Winter Transect Surveys (see Appendix 7-4, Figure 7.8.3). All observations consisted of individual birds seen in hunting or travelling flights. One observation occurred on the 28th of March 2016, while the remaining four observations occurred during the 2016/17 winter season between December 2016 and February 2017.

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

7.4.11 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 only recorded once during Vantage Point Surveys between February 2015 and February 2017 (see Appendix 7-4, Figure 7.1.7). On the 12th of April 2016 an individual buzzard was recorded soaring high off site to the east-southeast, above the height band considered for PCH (i.e. >175m). No evidence of breeding behaviour was observed.

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

7.4.12 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 recorded on 16 occasions during Vantage Point Surveys (see Figure 7.1.8, Appendix 7-4). Only one of the 16 observations occurred within, or partially within the height band considered for PCH, while the remaining observations all occurred less than 10m above ground level. Three observations occurred during April 2015, while six observations occurred during the 2015/16 non-breeding season, between December 2015 and March 2016. Three observations occurred during the 2016 breeding season between the months of June and July. The remaining four observations occurred during the 2016/17 non-breeding season between October 2016 and February 2017.

The three observations between June and July 2016 consisted of drumming/displaying and calling snipe within an area of upland blanket bog, within the Cleanrath wind farm development, to the southeast of VP3. This behaviour is indicative of probable breeding in the area. The location of the probable breeding territory can be found on Figure 7.1.8.1, Appendix 7-4.

Breeding Bird Surveys

Snipe were recorded on 23 occasions during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.7). Ten observations occurred during the 2015 breeding season between the months of April and August. On the 9th of July three individuals were heard calling from areas of suitable breeding habitat. On the 19th of August two pairs of snipe were flushed from two separate areas of suitable breeding habitat. These observations indicate probable breeding in these areas.

The remaining thirteen observations occurred during the 2016 breeding season between April and August 2018. A pair were seen or hear in areas of suitable breeding habitat on two occasions while the remaining observations consisted of individual birds.

Winter Transect Surveys

Snipe were recorded on 24 occasions during Winter Transect Surveys (see Appendix 7-4, Figure 7.8.4). Observations occurred between November 2016 and February 2017. Numbers recorded ranged from individuals to three birds. Twenty-two observations occurred within the Cleanrath wind farm development, while only two observations occurred outside the site to the southwest.

Incidental Observations

There were five incidental observations of snipe recorded between February 2015 and March 2017. Four of these observations were recorded during dedicated Red Grouse Surveys. One observation occurred in March 2015, two observations occurred in March 2016 while the final observation occurred

in March 2017. The remaining observation occurred during a Hen Harrier Roost Survey on the 12th of December 2016 as an individual was heard calling.

7.4.13 Teal

Raw Survey data for teal is provided in Appendix 7-4.

Breeding Bird Surveys

Teal were only recorded once during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.8). On the 15th of April 2015 a pair of teal was disturbed from an area of blanket bog within the Cleanrath wind farm development, but more than 300m from the nearest turbine, before flying southeast away from the site. While this pair were recorded in potentially suitable breeding habitat, teal were not subsequently recorded within or near the Cleanrath wind farm development during the remainder of this or the following breeding season.

Waterfowl Surveys

Teal were recorded on 26 occasions during Waterfowl Surveys at Lough Allua, approximately 2km to the south of the Cleanrath wind farm development (see Figure 7-7). Numbers recorded ranged from a pair of birds to a maximum flock of eight. Twelve observations occurred between December 2015 and March 2016, while the remaining 14 observations all occurred during the 2016/17 winter season between August 2016 and February 2017. There were no additional observations of this species during any of the other comprehensive surveys.

7.4.14 Passerines (Red Listed)

The BoCCI Red listed species meadow pipit was recorded during the surveys undertaken. Meadow pipit were regularly recorded across all survey types.

7.5 Field Survey Results 2018-2020

7.5.1 Pre-Commencement Survey Results (2018)

7.5.1.1 Kestrel

Kestrel were observed on six occasions during pre-commencement bird surveys between June and August 2018. Four observations occurred during breeding raptor surveys within 2km of the Cleanrath wind farm development, while two observations occurred during Breeding Bird Surveys within 500m of the development footprint. All observation consisted of individual birds seen hunting and hovering. While both male and female birds were observed during surveys, no evidence of breeding activity was recorded. No juvenile or fledgling birds were recorded on site or within 2km of same during the latter part of the breeding season. The location of all kestrel observations can be seen on Figure 1-1 and Figure 2-1 in Appendix 7-7.

7.5.1.2 Sparrowhawk

Sparrowhawk were observed on four occasions during pre-commencement bird surveys between June and August 2018. Two observations occurred during breeding raptor surveys within 2km of the Cleanrath wind farm development, while two observations occurred during Breeding Bird Surveys within 500m of the development footprint. All four observations consisted of individual birds seen hunting or soaring. No evidence of breeding activity was recorded. No juvenile or fledgling birds were recorded on site or within 2km of same during the latter part of the breeding season. The location of all sparrowhawk observations can be seen on Figure 1-2 and Figure 2-2 in Appendix 7-7.

7.5.1.3 Passerines (Red Listed)

The red listed breeding species meadow pipit was recorded on two occasions during Breeding Bird Surveys between June and August 2018. Six meadow pipit were recorded on the 24th of June 2018, while a meadow pipit was also recorded on the 17th of August 2018. On the 24th of June there were two observations of two or more meadow pipit seen in areas of suitable breeding habitat during the breeding season, indicating breeding territories in these areas. Neither observation occurred within the development footprint, indicating that no breeding territories would be as a result of direct habitat loss from construction of the Cleanrath wind farm development. The location of all meadow pipit observations can be seen on Figure 1-3 in Appendix 7-7.

7.5.2 Operational Monitoring Survey Results (2020)

7.5.2.1 Golden Plover

Raw Survey data for golden plover recorded during Operational Monitoring is provided in Appendix 7-8.

Vantage Point Surveys

Golden plover were observed on six occasions during Vantage Point Surveys between February 2020 and May 2020. Five observations were of small to moderate sized flocks seen in flight, while one observation consisted of a flock heard calling, but not seen, after being disturbed from a known roost site at VP1 (see Figure 1-1 in Appendix 7-8). The location of this golden plover roosting area is located approximately 400m from the nearest turbine and can be seen on. All six observation were recorded on site during surveys at VP1. On the 13th of February 2020 a flock of 37 golden plover were seen in flight after they were disturbed from an area where they were roosting and feeding. The remaining five

observations all occurred on the 14th of March 2020 as flocks ranging between 20 and 65 birds were heard calling and seen in flight over the Cleanrath wind farm development.

Winter Transect Surveys

Golden plover were only observed once during Winter Transect Surveys. On the 5th of March 2020 a flock of 23 golden plover were observed loafing in area of upland blanket bog approximately 200m from the nearest turbine. The location of this observation can be seen on Figure 4-1 in Appendix 7-8.

Incidental Observations

Golden plover were observed in flight on four occasions during hen harrier roost surveys between February and March 2020. All four observations occurred offsite during hen harrier roost surveys on the 12th of March 2020, as flocks ranging from seven to 78 birds were seen in flight. The flock of 78 birds were flushed by the surveyor from an area of upland blanket bog where they were roosting.

7.5.2.2 Hen Harrier

Raw Survey data for hen harrier recorded during Operational Monitoring is provided in Appendix 7-8.

Breeding Raptor Surveys

Hen harrier was observed on one date during a Breeding Raptor Survey on the 15th of May 2020 (see Figure 3-1, Appendix 7-8). An adult male was recorded hunting and soaring on two occasions during the survey, more than 2km to the north of the Cleanrath wind farm development. No evidence of breeding activity was observed.

7.5.2.3 White-tailed Eagle

Raw Survey data for white-tailed eagle recorded during Operational Monitoring is provided in Appendix 7-8.

Vantage Point Surveys

White-tailed eagle were only observed on one occasion during Vantage Point Surveys between February 2020 and May 2020. An individual bird was seen flying above the Potential Collision Height (PCH) more than 7km from the Cleanrath wind farm development on the 5th of March 2020 (see Figure 1-2, Appendix 7-8).

7.5.2.4 Merlin

Raw Survey data for merlin recorded during Operational Monitoring is provided in Appendix 7-8.

Winter Transect Surveys

Merlin was observed once during Winter Transect Surveys between February and March 2020 (see Figure 4-2, Appendix 7-8). A single bird was observed hunting over an area of upland blanket bog, more than 1km north of the nearest turbine, on the 12th of March 2020. The bird was noted as a female or immature bird in potential breeding habitat.

Incidental Observations

Merlin were observed on two occasions during Hen Harrier Roost Surveys. Both observations consisted of an adult male seen in flight before dusk). On the 5th of February 2020 a male was seen in a low flight before descending into scrub in an area to the northeast of HHVP3. On the 5th of March 2020 a male merlin was seen in flight and perched along the roadside during a survey at HHVP2.

7.5.2.5 Peregrine

Raw Survey data for peregrine recorded during Operational Monitoring is provided in Appendix 7-8.

Vantage Point Surveys

Peregrine were observed on two occasions during Vantage Point Surveys between February and May 2020 (see Figure 1-3, Appendix 7-8). Both flights occurred off-site more than one kilometre from the nearest turbines. Both observations consisted of an individual birds seen in flight on separate dates in March 2020 (5th and 14th of March).

Incidental Observations

Peregrine were observed on two occasions during Hen Harrier Roost Surveys. Both observations occurred during the same survey on the 12th of March 2020, within a fifteen-minute period. On both occasions an individual was seen in flight before dusk.

7.5.2.6 Little Egret

Raw Survey data for little egret recorded during Operational Monitoring is provided in Appendix 7-8.

Vantage Point Surveys

Little egret were only observed on one occasion during Vantage Point Surveys between February and May 2020. On the 14th of March 2020 an individual bird was seen in a low flight, over an area of wet heath near Cleanrath Lough, more than 400m from the nearest turbine before flying behind trees and out of site (see Figure 1-4, Appendix 7-8).

7.5.2.7 Woodcock

Raw Survey data for woodcock recorded during Operational Monitoring is provided in Appendix 7-8.

Incidental Observations

Woodcock were observed on three occasions during Hen Harrier Roost Surveys. All three observations consisted of individual birds seen in flight between the 4th and 5th of March 2020 during hen harrier roost surveys offsite.

7.5.2.8 Kestrel

Raw Survey data for kestrel recorded during Operational Monitoring is provided in Appendix 7-8.

Vantage Point Surveys

Kestrel were observed on five occasions during Vantage Point Surveys between February and May 2020 (see Figure 1-5, Appendix 7-8). Only two flights occurred within 500m of turbines. Three

observations occurred in March 2020 with individual birds seen in flight on each occasion. The remaining observations occurred on the 3rd of May as a breeding pair of kestrel were observed together. The female was seen perched at the edge of conifer plantation, while the male was seen bringing her food on multiple occasions throughout the survey. This behaviour is indicative of a confirmed nest site in the area with the female likely to have been brooding. The confirmed nest site was located approximately 600m northwest of the nearest turbine in an area of forestry away from the Cleanrath wind farm development (see Figure 1-5, Appendix 7-8).

Breeding Bird Surveys

Kestrel were observed once during Breeding Bird Surveys from May 2020 (see Figure 2-1, Appendix 7-8). On the 23rd of May an adult male was seen foraging over an area of wet grassland and conifer plantation, briefly flying in proximity of turbine blades and within the potential collision height. No evidence of breeding activity was recorded.

Breeding Raptor Surveys

Kestrel were only observed on one occasion during Breeding Raptor Surveys in May 2020. On the 9th of May 2020 an adult male kestrel was recorded hunting over an area of wet grassland, approximately 1km from the nearest turbine, during a survey at RVP2 (see Figure 3-2, Appendix 7-8). No evidence of breeding activity was recorded.

Winter Transect Surveys

Kestrel were observed on three occasions during Winter Transect Surveys between February and March 2020 (see Figure 4-3, Appendix 7-8). All three observations consisted of the same adult male seen in flight on three occasions on the 12th of March 2020. Two of the individual's flights involved hunting while the other was a displaying flight approximately 1km north of the nearest. This displaying flight in early March is indicative of possible breeding in the area.

Incidental Observations

Kestrel were observed on six occasions during Hen Harrier Roost Surveys between February and March 2020. All six observations consisted of individual birds seen in flight. Five observations were of individuals seen in hunting flights while a female or juvenile bird was seen flying and landing in an area of conifer plantation at dusk.

7.5.2.9 Sparrowhawk

Raw Survey data for sparrowhawk recorded during Operational Monitoring is provided in Appendix 7-8.

Breeding Raptor Surveys

Sparrowhawk were only observed on one occasion during Breeding Raptor Surveys in May 2020 (see Figure 3-3, Appendix 7-8). On the 9th of May 2020 a male sparrowhawk was seen hunting over an area of wet grassland and conifer plantation, approximately 1km from the Cleanrath wind farm development and 2km northeast of the nearest turbine, during a survey at RVP1. No evidence of breeding activity was observed.

Winter Transect Surveys

Sparrowhawk were only observed on one occasion during Winter Transect Surveys between February and March 2020 (see Figure 4-4, Appendix 7-8). On the 12th of March 2020 an individual sparrowhawk was seen in flight approximately 300m west of the nearest turbine.

7.5.2.10 Buzzard

Raw Survey data for buzzard recorded during Operational Monitoring is provided in Appendix 7-8.

Winter Transect Surveys

Buzzard were only observed on one occasion during Winter Transect Surveys between February and March 2020 (see Figure 4-5, Appendix 7-8). On the 5th of February 2020 an individual buzzard was seen in flight, more than 600m south of the nearest turbine.

Incidental Observations

Buzzard were observed on three occasions during Hen Harrier Roost Surveys between February and March 2020. Each observation consisted of individuals seen in flight. No evidence of roosting or breeding activity was observed.

7.5.2.11 Snipe

Raw Survey data for snipe recorded during Operational Monitoring is provided in Appendix 7-8.

Winter Transect Surveys

Snipe were only observed on one date during Winter Transect Surveys between February and March 2020 (see Figure 4-6, Appendix 7-8). On the 5th of March 2020 snipe were observed on two occasions both of which occurred within 100m of the development footprint and turbine layout. A single bird was heard chipping and calling from an area of bog and wet heath, while later a bird, possibly the same individual was flushed from an area of bog.

7.5.2.12 Passerines (Red Listed)

The BoCCI Red listed species meadow pipit was recorded during the surveys undertaken. A pair of meadow pipit were recorded on the 23rd of May 2020, calling from an area of suitable breeding habitat (see Figure 2-2, Appendix 7-8). This observation indicates probable breeding in the area.

7.5.2.13 Results of Corpse Searches

As previously discussed, corpse searching surveys were undertaken between January and May 2020. On the 21st of April 2020 a feather spot was found at ITM 521150, 569527, approximately 60m north of the nearest turbine (T4). The feathers could not be determined at the time and were therefore sent for DNA analysis. The DNA analysis test results were received on the 22nd of July 2020. The analysis showed the feathers belonged to a skylark (*Alauda arvensis*), a passerine species which is amber listed under BoCCI conservation status. The cause of death for the skylark is unknown although collision with a turbine cannot be ruled out.

No Key Ornithological Receptor (KOR), target species, or any bird of conservation concern has been recorded as a fatality to date during ongoing corpse searches at the Cleanrath wind farm development.

7.6 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 Irelands Bird species. Where relevant, estimates for mean county populations have been derived following a review of I-WeBS sites in County Cork.

The field survey result from the pre-commencement and operational phase monitoring (i.e. results from 2018 to 2020) have been included to provide supporting information. In addition, including this data means some species have been included in the below section (e.g. little egret and white-tailed eagle) that would not have been evaluated otherwise, as they were not recorded between February 2015 and March 2017.

7.6.1 Whooper Swan

Wintering

During the 2015-2017 surveys, whooper swan flocks of National importance, as per NRA criteria (Burke et al, 2018), were not observed. Flocks of county importance, as per NRA criteria (Crowe et al, 2015), were observed on 13 occasions. All 13 observations occurred during Waterfowl Surveys, more than two kilometres from the Cleanrath wind farm development.

Furthermore, there were no observations during operational monitoring surveys between February and May 2020. Therefore, the Cleanrath wind farm development is of no ecological significance with regard to whooper swan.

Breeding

Whooper swan are not known to breed within Ireland and are generally only found during winter months. The species is not dependent on the Cleanrath wind farm development for breeding.

7.6.2 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 bird. 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 months between 2015 and 2020 was 78 birds. This maximum number does not correspond with the classification criteria for National or International Importance (Burke et al. 2018).

To estimate the county population, a review of all County Cork I-WeBS sites was undertaken. It should be noted that wintering golden plover will utilise agricultural grasslands and other habitats not typically surveyed during I-WeBS counts. Therefore, the population estimate provided based on I-WeBS figures below is likely to be an underestimate of the county population. The following mean count values have been recorded for Cork I-WeBS sites over the most recent 5-season period, i.e. for the period 2011/12 – 2015/16:

- Adrigole Harbour (mean = 0)
- Argideen River (mean = 0)
- Ballin Lough (mean = 0)

- Ballybranagan (mean = 1)
- Ballybutler Lake (mean = 0)
- Ballycotton Shanagarry (mean = 2,132)
- Ballycrenane/Warren (mean = 0)
- Ballydehob Estuary (mean = 0)
- Ballyhea Gravel Pit (mean = 0)
- Ballyhonock Lough (mean = 0)
- Ballymacoda (mean = 6,720)
- Ballynacarriga Lake (mean = 0)
- Bandon Estuary (mean = 0)
- Bandon River (mean = 0)
- Bantry Bay (mean = 17)
- Barely Cove Bay (mean = 0)
- Bear Haven (mean = 0)
- Blackwater Valley (mean = 0)
- Blarney Fen - Clogheenmilcon (mean = 0)
- Blarney Lake (mean = 0)
- Carrigillihy Lake (mean = 0)
- Castlemartyr Lake (mean = 0)
- Castlenalact Lake (mean = 0)
- Charleville Lagoons (mean = 0)
- Classes Lakes/Gravel Pits (mean = 0)
- Clonakility Bay (mean = 125)
- Cloonties Lake (mean = 0)
- Cork Harbour (mean = 4,067)
- Corran Lake (mean = 0)
- Courtmacsherry Bay, Broadstrand Bay & Dunworley (mean = 160)
- Croagh Bay (mean = 0)
- Crookhaven (mean = 1)
- Curraghlicky Lake (mean = 0)
- Gallanes Lough, Clonakility (mean = 0)
- Garryhesta Gravel Pit (mean = 0)
- Glandore Harbour/Union Hall (mean = 0)
- Ilen Estuary (mean = 0)
- Inishcarra Reservoirs (mean = 2,783)
- Kilcolman Marsh (mean = 0)
- Kilkern Lake (mean = 0)
- Lissagriffin Lake (mean = 54)
- Lough Aderry (mean = 0)
- Lough Atarriff (mean = 0)
- Lough Cluhir (mean = 0)
- Lough Gorm (mean = 0)
- Madame Lake (Batemans Lough) (mean = 0)
- Mahona Lough (mean = 0)
- Myross Island & Inlet (mean = 0)
- Nohoval Lake (mean = 0)
- Ringabella Creek (mean = 0)
- Roaringwater Bay (mean = 0)
- Rosbrin Cove (mean = 0)
- Rosscarbery (mean = 2,640)
- Sherkin Island (mean = 0)
- Shreeland Lakes (mean = 0)
- Stick Estuary (mean = 0)
- Toormore Bay (mean = 0)

Based on the above, the mean wintering population from Cork I-WeBS sites is 18,700.Therefore, taking a precautionary approach, a regularly occurring population of 187 birds (1% of Cork county population) is considered of County Importance in the context of the Cleanrath wind farm development. The maximum number of birds recorded from the winter season was 78 birds. This maximum number does not correspond with the classification criteria for County Importance (i.e. 187 birds). The population recorded at the development site was therefore assigned **Local Importance (Higher Value)** on a highly precautionary basis.

Breeding

No evidence of breeding activity was recorded. The breeding distribution of golden plover in Ireland is restricted to north of Galway Bay (Balmer et al., 2013). Therefore, the potential for breeding golden plover to occur in the vicinity of the Cleanrath wind farm development is extremely low.

7.6.3 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.

Hen harrier were recorded on 16 occasions during winter months (September – February) between 2015 and 2017. During dedicated hen harrier roost surveys no evidence of roosting hen harrier was recorded either on site or within 2km of same. All observations consisted of individuals observed in hunting or commuting flights. During the 2016/17 winter season a single male and two female birds were observed during a survey on the 20th of December 2016. Hen harrier were not observed during winter months between February and March 2020 operational surveys.

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

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 only recorded on one date during breeding season surveys between 2015 and 2017. On this occasion two hen harrier were recorded in separate flights. One individual was flying directly over the site, while the other was seen offsite to the north of the Cleanrath wind farm development. No indication of breeding behaviour was observed either on site or within 2km of same. During a Breeding Raptor Survey on the 15th of May 2020 a single hen harrier was seen in flight on two occasions. No evidence of breeding activity was observed.

Numbers of ecological importance were not recorded during the breeding season. The development site is of no importance to breeding hen harrier.

7.6.4 Chough

As reported (2008-2012) under Article 12 of the Birds Directive (Directive 2009/147/EC), the estimated population of chough is 839 breeding pairs.

This species is predominantly found in coastal areas on the west and southwest coast Ireland where it breeds on cliff faces, caves etc. Chough were only recorded on two separate dates throughout the extensive suite of surveys between 2015 and 2020. On the 17th of September 2015 chough were recorded on five occasions within a one-hour period, with a maximum of three individuals seen at any one time interacting with one another. On the 28th of July 2016 a small flock of seven chough were seen circling and calling for a long period over an area of farmland, directly adjacent to the north of the Cleanrath wind farm development.

No evidence of breeding activity was observed, in addition all observations were recorded outside the core breeding period of March to June (Trewby, 2010). Taking a highly precautionary approach, the population recorded was assigned **County Importance.**

7.6.5 Merlin

As reported (2008-2012) under Article 12 of the Birds Directive (Directive 2009/147/EC), the estimated population of Merlin is between 200 – 400 pairs based on Hardy et al (2009).

Merlin were only recorded on two occasions during surveys between February 2015 and February 2017. Both observations occurred on the 14th of July 2015, consisting of an individual seen on two occasions, at the western boundary of the Cleanrath wind farm development. No evidence of breeding activity was observed. Furthermore, merlin were observed on three occasions during operational monitoring surveys in 2020 between February and March. Two observations occurred offsite during Hen Harrier Roost surveys, while the other occurred approximately 1.5km north of the nearest turbine during a winter transect survey.

Taking a precautionary approach, the population recorded was assigned **Local Importance (Higher Value)**.

7.6.6 Peregrine

The estimated national breeding population of peregrine in Ireland is 425 breeding pairs as per the National Breeding Peregrine Survey 2017 (IRSG 2018, Unpublished Report). Peregrine were recorded on five occasions during surveys between February 2015 and February 2017. Only two of these observations occurred during the core breeding season for this species (April – August), and there was no evidence of breeding activity either on site or within 2km of same. Furthermore, peregrine were observed on six occasions during operational monitoring bird surveys between the 5th and 17th of March 2020. All observations were of individual birds. No evidence of breeding activity was observed either onsite or in the wider areas, with birds seen foraging or travelling over the Cleanrath wind farm development.

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

7.6.7 White-tailed Eagle

White-tailed Eagle have been reintroduced to Ireland between 2007 and 2011 in Killarney Co. Kerry. There are an estimated 12 active territories of white-tailed eagle in the country, as well as several unpaired individuals. There was a single observation of this species between February 2015 and May 2020. The bird was recorded c. 7km from Cleanrath wind farm development. The development site was not found to be of significance to the species.

7.6.8 Little Egret

Little egret were only observed on one occasion during Vantage Point Surveys between February 2015 and May 2020. Numbers of ecological significance were not recorded. The development site is not of significance to the species.

7.6.9 Wigeon

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

All observations during the winter season occurred more than 2km from the Cleanrath wind farm development. Numbers of ecological significance were not recorded. The development site is not of significance to the species. A pair of wigeon were flushed from suitable breeding habitat on the 15th of April 2015. While a pair was recorded onsite, wigeon were not subsequently recorded in this location during the remainder of this or the following breeding season. As it is extremely rare for this species to breed in Ireland and given there were no further records onsite it is reasonable to conclude that the above record does not constitute a breeding attempt.

7.6.10 Woodcock

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

Each winter there is a large influx of migrants from continental Europe that boosts the resident Irish population. Despite this the species was only observed on six occasions throughout the extensive suite of bird surveys between 2015 and 2020, all of which occurred during winter months. There were no records of roding (displaying) woodcock onsite despite vantage point and other surveys overlapping with dawn/dusk during April and May. Numbers of ecological importance were not recorded. The Cleanrath wind farm development is of no importance to woodcock.

7.6.11 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.

7.6.12 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.

7.6.13 Buzzard

Buzzard is not listed on Annex I of the Birds Directive. The species is Green listed in Ireland (BoCCI). The species was only observed on five occasions throughout the extensive suite of bird surveys between 2015 and 2020. Numbers of ecological importance were not recorded. The Cleanrath wind farm development is of no importance to buzzard.

7.6.14 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.

7.6.15 Teal

Teal is amber listed in Ireland for its breeding and wintering population (BoCCI). All observations during the winter season occurred more than 2km from the Cleanrath wind farm development. A pair of teal were flushed from suitable breeding habitat on the 15th of April 2015. While a pair was recorded onsite, teal were not subsequently recorded in this location during the remainder of this or the following breeding season. Numbers of ecological significance were not recorded. The development site is not of significance to the species.

7.6.16 Passerines (Red Listed)

Meadow pipit are Red listed in Ireland during the breeding season. The population of meadow pipit recorded was deemed to be of no greater than **Local Importance (Lower Value)**.

7.7 Identification of Key Ornithological Receptors

Table 7-11 Avifaunal Receptor Evaluation and Selection Criteria Rationale

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rationale for inclusion/exclusion as KOR	KOR Yes/No
Whooper Swan	Annex I, EU Birds Directive	**Wintering** No population of ecological significance recorded	This species was not recorded within the Cleanrath wind farm development. There is no suitable habitat within the Cleanrath wind farm development and there is no evidence to suggest that the Cleanrath wind farm development is of significance to this species. There is no potential for direct habitat loss or displacement. No flights were recorded during VP surveys. Collision risk is therefore not predicted to significantly impact this species.	**No**
Golden Plover	Annex I, EU Birds Directive; BoCCI Red List & Irish Wildlife Act.	**Wintering** Local Importance (Higher Value)	This species was recorded loafing/roosting within the Cleanrath wind farm development during winter months. The potential for habitat loss cannot be excluded. **An assessment of direct habitat loss is required.** Birds were recorded within the Cleanrath wind farm development. Taking a precautionary approach, **the potential for displacement exists**. This species was recorded flying over the development site. **A collision risk assessment is required.**	**Yes**
Hen Harrier	Annex I, EU Birds Directive; BoCCI	**Wintering**	No evidence of breeding was recorded on or near the site. This species was occasionally recorded foraging within the Cleanrath wind farm development during winter months. The potential	**Yes**

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rationale for inclusion/exclusion as KOR	KOR Yes/No
	Amber List & Irish Wildlife Act.	National/International Importance recorded	for habitat loss cannot be excluded. **An assessment of direct habitat loss is required.** Birds were recorded within the Cleanrath wind farm development boundary. Taking a precautionary approach, **the potential for displacement exists**. This species was recorded flying over the development site. **A collision risk assessment is required.**	
Chough	Annex I, EU Birds Directive	**Wintering** County Importance	No evidence of breeding was recorded on or near the site. This species was recorded foraging within the Cleanrath wind farm development and within 500m of same on two occasions. The potential for habitat loss, however small, cannot be excluded. **An assessment of direct habitat loss is required.** Birds were recorded within the Cleanrath wind farm development boundary. Taking a precautionary approach, **the potential for displacement exists**. No flights were recorded during VP surveys. Collision risk modelling cannot therefore be carried out, with the available data.	**Yes**

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rationale for inclusion/exclusion as KOR	KOR Yes/No
Merlin	Annex I, EU Birds Directive; BoCCI Amber List & Irish Wildlife Act.	**All Seasons** Local Importance (Higher Value)	This species was only recorded on two occasions during surveys between 2015 and 2017, both of which occurred on the same day during a Breeding Raptor Survey, to the west of the Cleanrath wind farm development. Furthermore, there were three observations of merlin during 2020 operational monitoring surveys. The habitat found within the Cleanrath wind farm development provides suitable foraging habitat for merlin. The potential for direct habitat loss, however small, cannot be excluded. **An assessment of direct habitat loss is required.** This species was recorded within 500m of the turbines during surveys. Taking a precautionary approach, **the potential for displacement exists**. No flights were recorded during VP surveys. Collision risk modelling cannot therefore be carried out, with the available data.	**Yes**
Peregrine	Annex I, EU Birds Directive; BoCCI Green List & Irish Wildlife Act.	**All Seasons** Local Importance (Higher Value)	This species was occasionally recorded foraging within the development site. The potential for direct habitat loss cannot be excluded. **An assessment of direct habitat loss is required.** Birds were recorded within the development site boundary. Taking a precautionary approach, **the potential for displacement exists**.	**Yes**

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rationale for inclusion/exclusion as KOR	KOR Yes/No
			This species was recorded flying over the development site within the potential collision risk zone. **A collision risk assessment is required.**	
White-tailed Eagle	Annex I, EU Birds Directive; BoCCI Green List & Irish Wildlife Act.	**NA**	This species was only recorded on a single occasion c. 7km from the Cleanrath wind farm development. There was no pathway for impacts identified. Please refer to Section 7.6.7 for further details.	**No**
Little Egret	Annex I, EU Birds Directive; BoCCI Green List & Irish Wildlife Act.	**NA**	Little egret were only recorded on one occasion within proximity of the Cleanrath wind farm development, at Cleanrath Lough approximately 450m from the nearest turbine. There is no potential for significant habitat loss, disturbance displacement or collision risk to occur. Please refer to Section 7.6.8 for further details.	**No**
Wigeon	BoCCI Red Listed (Wintering Populations) & Irish Wildlife Act	**All Seasons** No population of ecological significance recorded	Wigeon were only recorded on one occasion within the Cleanrath wind farm development or proximity of same, which occurred during the breeding season. All observations during the winter season occurred more than 2km from the Cleanrath wind farm development. There is no potential for direct habitat loss, displacement or collision to occur. Please refer to Section 7.6.9 for further details.	**No**
Woodcock	BoCCI Red Listed (Breeding Populations) & Irish Wildlife Act.	**Breeding** Not recorded during the breeding season	This species was only observed on six occasions throughout the extensive suite of bird surveys, all of which occurred during winter months. There is no potential for direct habitat loss, displacement or collision risk to occur. For further details please refer to Section 7.6.10.	**No**

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rationale for inclusion/exclusion as KOR	KOR Yes/No
Kestrel	BoCCI Amber List & Irish Wildlife Act.	**All Seasons** Local Importance (Higher Value)	The potential for habitat loss, cannot be excluded. **An assessment of direct habitat loss is required.** The species was recorded within the site boundary. **An assessment of displacement effect is required.** This species was recorded flying over the site. **A collision risk assessment is required.**	**Yes**
Sparrowhawk	BoCCI Amber List & Irish Wildlife Act.	**All Seasons** Local Importance (Higher Value)	The potential for habitat loss, cannot be excluded. **An assessment of direct habitat loss is required.** The species was recorded within the site boundary. **An assessment of displacement effect is required.** This species was recorded flying over the site. **A collision risk assessment is required.**	**Yes**
Buzzard	Irish Wildlife Act	**All Seasons** No population of ecological significance recorded	Buzzard was only recorded on five occasions. There is no potential for direct habitat loss or displacement to occur. No flights were recorded within the potential collision risk zone during VP surveys. Collision risk is therefore not anticipated for this species.	**No**
Snipe	BoCCI Amber List & Irish Wildlife Act.	**All Seasons** Local Importance (Higher Value)	The potential for habitat loss, cannot be excluded. **An assessment of direct habitat loss is required.** The species was recorded within the site boundary. **An assessment of displacement effect is required.**	**Yes**

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rationale for inclusion/exclusion as KOR	KOR Yes/No
			This species was recorded flying over the site within the potential collision risk zone. **A collision risk assessment is required.**	
Teal	BoCCI Amber List & Irish Wildlife Act.	**All Seasons** No population of ecological significance recorded	Teal were only recorded on one occasion within the Cleanrath wind farm development or proximity of same, which occurred during the breeding season. All observations during the winter season occurred more than 2km from the Cleanrath wind farm development. There is no potential for direct habitat loss, displacement or collision to occur. Please refer to Section 7.6.15 for details.	**No**
Passerines (Red Listed)	BoCCI Red List & Irish Wildlife Act	**All Seasons** Local Importance (Lower Value)	As per SNH guidance, it is considered that passerine species are not significantly impacted by wind farms. Significant impacts are not predicted.	**No**

7.8 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. The sensitivity of KOR as per Percival are listed below and include the rationale for their respective sensitivity classification included in brackets.

None of the KORs recorded during surveys at Cleanrath were classified as Very High Sensitivity.

High Sensitivity KORs include:

- Hen Harrier (Ecologically Sensitive Species; Annex I; EU Birds Directive)
- Chough (Ecologically Sensitive Species; Annex I; EU Birds Directive)

Medium Sensitivity KORs include:

- Golden Plover (Annex I; EU Birds Directive; BoCCI Red Listed)
- Merlin (Annex I; EU Birds Directive)
- Peregrine (Annex I; EU Birds Directive)

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

- Kestrel (Schedule IV of Wildlife Act; 1976)
- Sparrowhawk (Schedule IV of Wildlife Act; 1976)
- Snipe (BoCCI; Amber Listed)

7.9 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 Key Ornithological Receptors
- Assessment of effects in relation to sites designated for nature conservation.
- Summary of potential effects associated with infrastructure

All elements of the Cleanrath wind farm development have been considered in assessing effects on ornithological receptors, including:

- Site preparation works, upgrades to existing roads and tracks, construction of new site roads.
- Drainage works.
- Machinery access to the turbine locations.
- Excavation of turbine base foundations.
- Erection of turbines.
- Grid connection works including underground cabling and the Derragh substation.
- Operational Maintenance.
- Decommissioning works and turbine removal (SNH 2013).

7.9.1 Do-Nothing Effect

A do-nothing option to developing the Cleanrath wind farm development would have been to leave the site as it was prior to construction, with no changes made to the land-use practices of low-intensity agriculture, turf cutting and commercial forestry. This option would have no positive impact with regards to the production of renewable energy or the offsetting of greenhouse gas emissions. On the

basis of the positive environmental effects arising from the Cleanrath wind farm development, the do–nothing scenario was not the chosen option. Instead, an application for planning permission was made and granted ultimately by An Bord Pleanála.

The Cleanrath wind farm development has been constructed, has been operational and is now operating in Sleep Mode with the site essentially in a shut-down mode with no export of electricity pending the outcome of the Substitute Consent process. In the event that Substitute Consent is obtained, the intention is to recommence and continue the full operation of the Cleanrath wind farm development until the end of 25 years from the formal commissioning of the turbines in July 2020 and implement the decommissioning plan for the Cleanrath wind farm development at the end of the operational period.

In the event that Substitute Consent is not granted and full operation of the development is not recommenced, it will remain in Sleep Mode which is, in effect, the "do nothing" option insofar as it represents the current situation as at the date of the application for Substitute Consent. There is the possibility that the decommissioning plan may need to be implemented early, should Substitute Consent not be granted, and therefore this is also assessed in this rEIAR and below.

The avian communities on the site would likely remain similar to its current state as activity levels and land use would not change significantly. In the specific case of forestry within and surrounding the Cleanrath wind farm development its value and suitability for local avian receptors will vary with the management of the commercial forestry. Forestry plantations in their initial years prior to canopy closure have the potential to support certain species (e.g. hen harrier), and as the forestry matures it is utilised by other species that favour woodland conditions. Therefore, as forestry matures/ is felled there is potential for ongoing loss/creation of supporting habitat.

7.9.2 Effects on Key Ornithological Receptors during Construction and Operation

7.9.2.1 Hen Harrier (*Wintering*)

Table 7-12 Impact Characterisation for Hen Harrier based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	No evidence of breeding or roosting was recorded within the Cleanrath wind farm development or 2km of same between February 2015 and March 2017. Hen harrier were recorded on 16 occasions during winter months. Observations consisted of male and female birds foraging within the Cleanrath wind farm development on occasion. Significant effects are not predicted to occur particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat exist post construction and there is an abundance of suitable habitat in the surrounding area. Significant effects are not anticipated to occur at the county, national and international scale.	The magnitude of the effect is assessed as *low.* The cross tablature of a *High* sensitivity species and *low* Impact corresponds to a ***Low*** effect significance	**Long-term Slight Negative Effect**
Displacement	Hen harrier were recorded on 16 occasions during winter months. Observations consisted of male and female birds foraging within the Cleanrath wind farm development on occasion. No evidence of breeding or roosting was observed within the Cleanrath wind farm development. Based on the core dataset there is no potential for significant displacement effects to occur given that hen harrier were not dependent on the habitats located in close proximity to development infrastructure for roosting or breeding. Extensive areas of	The magnitude of the effect is assessed as *low.* The cross tablature of a *High* sensitivity species and *low* Impact corresponds to a ***Low*** effect significance	**Short-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	suitable foraging habitat exist post construction and there is an abundance of suitable habitat in the surrounding area. Significant effects are not anticipated to occur at the county, national and international scale.		
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not likely to occur or have occurred	**No Effect**	**No Effect**
Displacement	Turbine avoidance has been observed in hen harrier at one wind farm installation to extend to within 250m of turbines (Pearce-Higgins et al. 2009). This study predicted a 52% reduction in breeding population within 500m of a wind energy array but found no significant modification in flight height near turbines. Hen harrier were only recorded on one date during the four months of operational phase monitoring, with an individual recorded in flight twice, both observations occurred more than 2km from the Cleanrath wind farm development and nearest turbines. Based on the core dataset there is no potential for significant displacement effects to occur or have occurred given that hen harrier were not dependent on the habitats located in close proximity to development infrastructure for roosting or breeding. Foraging was only occasionally recorded onsite. Significant effects are not anticipated to occur or have occurred at the county, national and international scale.	The magnitude of the effect is assessed as *low.* The cross tablature of a *High* sensitivity species and *low* Impact corresponds to a ***Low*** effect significance	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Collision	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 7-5. The collision risk has been calculated at a rate of 0.003 collisions per year, or one bird every 333 years. The predicted collision risk is insignificant in the context of the county, national and international population.	The magnitude of the effect is assessed as *negligible*. The cross tablature of a *High* sensitivity species and *Negligible* Impact corresponds to a ***Very Low*** effect significance	**Long-term Imperceptible Negative Effect**

7.9.2.2 Golden Plover (*Wintering*)

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

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	No evidence of foraging activity was recorded within the development footprint. The majority of golden plover that were recorded within the Cleanrath wind farm development were associated with the high ground in the north-west section of the site, as per Appendix 7-4 Figure 7.1.1. Golden plover utilise this area for roosting/loafing. Most observations consisted of very small flocks, with a maximum flock of 52 birds recorded throughout the two years of surveys. Significant effects with regard to direct habitat loss are not predicted to have occurred at the county, national and international scale, given no infrastructure was sited on the high ground where roosting/loafing was recorded.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* Sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance.	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Displacement	As per McGuinness et al (2015) the zone of sensitivity for the species is 800m during the breeding season only. However, only wintering populations were recorded and the species is not identified as being particularly sensitive to wind farm developments during this period. Most observations consisted of very small flocks, with a maximum flock of 52 birds recorded throughout the two years of surveys. No evidence of foraging activity was recorded within the development footprint. Significant areas of suitable roosting and foraging habitat exists in the wider landscape. The low numbers recorded within the Cleanrath wind farm development limits the potential for significant displacement effects to have occurred. In addition, the area of high ground where golden plover roosting/loafing occurred is c. 350m from the nearest turbine. Significant effects are not anticipated at the county, national and international scale.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* Sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance.	**Short-term Slight Negative Effect**
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated to occur or have occurred.	**No Effect**	**No Effect**
Displacement	A review of 29 other studies suggests Golden Plover will approach wind turbines to an average distance of 175 m in non-breeding season (Hötker et al. 2006). The majority of golden plover observations at the Cleanrath wind farm development were associated with the high ground in the north western section of the site, as per Appendix 7-4 Figure 7.1.1. The roosting/loafing that occurred in this area is c. 350m from the nearest turbine. Furthermore, operational phase monitoring has shown the rate of occurrence of golden plover to be broadly similar to the occurrence reported during pre-	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* Sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance.	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	planning surveys. During (migratory/wintering) operational vantage point surveys golden plover were recorded once in February and there were five flights recorded in March 2020. During the same months of pre-planning surveys golden plover were recorded at a rate of two/three flights a month. In addition, the species have continued to utilise the high ground in the north western section of the site for roosting after construction and commissioning of turbines within the Cleanrath wind farm development. If displacement were to occur or have occurred, there are sufficient areas of similar suitable habitat in the wider area to have rendered this impact inconsequential. Significant displacement effects are not anticipated at the county, national and international scale.		
Collision	Collision risk for waders is generally deemed to be low, due to a relatively low cursory flight path, coupled with high flight manoeuvrability (McGuinness et.al 2015). A review of pan-European collision assessments revealed much lower Golden Plover collision records than other species, though this was not controlled for survey effort or corpse recovery rates (Hötker et al. 2006). 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 7-5. In addition, the ratio of predicted collisions is provided in Appendix 7-5 to demonstrate that collision risk is not uniform for this species throughout the site. The collision risk has been calculated at a rate of 2.054 collisions per year. Annual mortality of adult golden plover has been calculated at 27% per annum (Sandercock, 2003). If 2.054 collisions were to occur per year, it would mean	The magnitude of the effect is assessed as *negligible*. The cross tablature of a *Medium* sensitivity species and *Negligible* Impact corresponds to a ***Very Low*** effect significance	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	that the losses at the Cleanrath wind farm would increase the annual mortality for the county population (i.e. 18,700 birds (please see Section 7.5.2 for further details)) by 0.04%. The predicted collision risk is therefore negligible (>1%) in the context of recorded population. No significant effects are anticipated to occur or have occurred regarding collision risk at the county, national and international scale.		

7.9.2.3 Chough (All Seasons)

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

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	Chough were only recorded on two dates during surveys between February 2015 and March 2017. All observations occurred during Breeding Bird Surveys within, or partially within the Cleanrath wind farm development. This species was not recorded utilising habitat within the site boundary for roosting or breeding. This species was only observed foraging within the Cleanrath wind farm development and 500m of same on two dates. Significant effects are not predicted to have occurred particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat remain post construction and there is an abundance of similar habitat in the surrounding area.	The magnitude of the effect is assessed as *low*. The cross tablature of a *High* sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	Significant effects are not anticipated to have occurred at the county, national and international scale.		
Displacement	This species was only observed on two dates throughout the extensive suite of surveys between 2015 and 2017. No evidence of breeding activity was recorded within the study area. Observations consisted of foraging birds. Given the low levels of activity recorded, significant displacement effects during construction are not anticipated to have occurred at the county, national and international scale.	The magnitude of the effect is assessed as *low*. The cross tablature of a *High* sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance	**Short term Slight Negative Effect**
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated to occur or have occurred	**No Effect**	**No Effect**
Displacement	As previously discussed, the species was only recorded twice onsite or within 500m of the Cleanrath wind farm development. Chough were not observed during pre-commencement or operational monitoring surveys. The availability of alternative suitable habitat in the surroundings and the overall infrequency of occurrence of the species at the site, limit the potential for significant disturbance displacement effects to occur or have occurred. Significant displacement effects are not predicted to occur or have occurred at the county, national and international scale.	The magnitude of the effect is assessed as *low*. The cross tablature of a *High* sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance	**Long-term Slight Negative Effect**
Collision	This species was not recorded in flight during the extensive VP survey work undertaken. Collision risk is not likely to have significantly impacted or to significantly impact this species.	**No Effect**	**No Effect**

7.9.2.4 Merlin (*All Seasons*)

Table 7-15 Impact Characterisation for Merlin based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	On the 14th of July 2015, a merlin was recorded on two occasions, along the edge of the conifer plantation directly adjacent to the western boundary of the Cleanrath wind farm development. While this constitutes a record of a merlin in suitable breeding habitat, breeding is unlikely to have occurred as it can be expected that there would have been more than two sightings of merlin across the two breeding seasons surveyed. These two sightings were the only merlin recorded during surveys between February 2015 and March 2017. In addition, in the unlikely event a merlin nest was present in the location of the July 2015 sighting, no development infrastructure was sited in this location. This species was not recorded utilising habitat within the site boundary for roosting or foraging. Significant effects are not predicted to have occurred particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat remain post construction and there is an abundance of suitable habitat in the surrounding area. Significant effects are not anticipated to have occurred at the county, national and international scale.	The magnitude of the effect is assessed as *low*. The cross tablature of *Medium* sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance	**Long-term Slight Negative Effect**
Displacement	No breeding or roosting territories were recorded within the study area.	The magnitude of the effect is assessed as *low*.	**Short-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	There were two observations of this species along the margins of the Cleanrath wind farm development throughout the entire survey period: February 2015 and March 2017. Significant displacement effects are not anticipated to have occurred, given how infrequently this species was encountered and owing to the abundance of similar suitable foraging habitat in the wider surroundings of the Cleanrath wind farm development. Significant effects are not anticipated to have occurred at the county, national and international scale.	The cross tablature of *Medium* sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance	
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	**No Effect**	**No Effect**
Displacement	As previously discussed, the species was only recorded twice along the margins of the Cleanrath wind farm development between February 2015 and March 2017. The availability of alternative suitable habitat in the surroundings and the overall infrequency of occurrence of the species at the site, limit the potential for significant disturbance displacement effects. Significant displacement effects are not predicted to occur or have occurred at the county, national and international scale. Merlin were observed on three occasions during operational monitoring bird surveys between February and March 2020. The results of operational phase monitoring to date have shown a broadly similar pattern of occurrence, with this species recorded slightly more frequently since the turbines went operational. These findings support the above assessment that no significant displacement impacts were predicted to occur or have occurred.	The magnitude of the effect is assessed as *negligible*. The cross tablature of *Medium* sensitivity species and *Negligible* Impact corresponds to a ***Very Low*** effect significance	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Collision	This species was not recorded during the extensive VP survey work undertaken. Collision risk is not likely to have significantly impacted or to significantly impact this species.	**No Effect**	**No Effect**

7.9.2.5 Peregrine (*All Seasons*)

Table 7-16 Impact Characterisation for Peregrine based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	Peregrine were recorded on five occasions during surveys between February 2015 and March 2017. Only two of these observations occurred during the core breeding season for this species (April – August). While there were occasional observations of this species foraging within the Cleanrath wind farm development during the breeding season, no evidence of breeding activity was recorded. Significant effects are not predicted to have occurred particularly given the low levels of activity recorded. In addition, extensive areas of suitable foraging habitat remained post construction given the internal infrastructure is only a small proportion of the total development area. Significant effects are not anticipated to have occurred at the county, national and international scale.	The magnitude of the effect is assessed as *low*. The cross tablature of *Medium* sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Displacement	As previously discussed, peregrine were recorded on five occasions during surveys between February 2015 and March 2017. Only two of these observations occurred during the core breeding season for this species (April – August). Significant displacement effects are not anticipated to have occurred, given how infrequently this species was encountered and owing to the abundance of similar suitable foraging habitat in the wider surroundings of the Cleanrath wind farm development. Significant effects are not anticipated to have occurred at the county, national and international scale.	The magnitude of the effect is assessed as *low*. The cross tablature of *Medium* sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance	**Short-term Slight Negative Effect**
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	**No Effect**	**No Effect**
Displacement	In total, this species was recorded on five occasions between February 2015 and March 2017. The availability of alternative suitable habitat in the surroundings and the overall infrequency of occurrence of the species at the site, limit the potential for significant disturbance displacement effects. Significant displacement effects are not predicted to occur or have occurred at the county, national and international scale. Peregrine were observed on four occasions during operational monitoring bird surveys between the 5th and 14th of March 2020. The results of operational phase monitoring to date have shown a broadly similar pattern of occurrence, with this species recorded slightly more frequently since the turbines went operational. These findings support the above assessment that no significant displacement impacts were predicted to occur or have occurred.	The magnitude of the effect is assessed as *low*. The cross tablature of *Medium* sensitivity species and *Low* Impact corresponds to a ***Low*** effect significance	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Collision	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 7-5. The collision risk has been calculated at a ratio of 0.025 collisions per year or one bird every 40 years. Therefore, it is very unlikely that there has been any collisions during the short period of operation, or will be any collisions of peregrine throughout the 25-year operational life of the Cleanrath wind farm development. The predicted collision risk is insignificant in the context of the county, national and international population.	The magnitude of the effect is assessed as *negligible*. The cross tablature of *Medium* sensitivity species and *Negligible* Impact corresponds to a ***Very Low*** effect significance	**Long-term Slight Negative Effect**

7.9.2.6 Kestrel (*All Seasons*)

Table 7-17 Impact Characterisation for Kestrel based on Percival (2003) & EPA (2017)).

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	The Cleanrath wind farm development is dominated by exposed rock and upland blanket bog, with areas of conifer plantation in the northeast corner of the Cleanrath wind farm development. Kestrel were the most frequently encountered key ornithological receptor at the Cleanrath wind farm development and were regularly observed foraging. Significant areas of foraging habitat remained post construction and there is an abundance of suitable habitat in the surrounding area.	The magnitude of the effect is assessed as *Medium*. The cross tablature of *Low* sensitivity species and *Medium* Impact corresponds to a ***Very Low*** effect significance	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	Kestrel were confirmed breeding in both 2015 and 2016 in areas of forestry within 500m of the Cleanrath wind farm development. No loss of nesting habitat occurred at either nest site given, no development infrastructure was sited at either of these locations. Significant effects are not predicted to have occurred at the county, national and international scale.		
Displacement	Three kestrel territories were identified, one in 2015 and two in 2016 as per Appendix 7-4 Figure 7.3.5.1. Of these, breeding was confirmed at the 2015 territory and confirmed for only one of the territories in 2016. In addition, kestrel were regularly recorded foraging within the Cleanrath wind farm development. Disturbance from construction activities is likely to have resulted in the partial loss of kestrel breeding and foraging habitat. However, there are significant areas of suitable nesting and foraging habitat within the wider area to limit the potential for significant effects to have resulted. Significant effects are not anticipated to have occurred at the county, national and international scale.	The magnitude of the effect is assessed as *Medium*. The cross tablature of *Low* sensitivity species and *Medium* Impact corresponds to a ***Very Low*** effect significance	**Short-term Slight Negative Effect**
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	**No Effect**	**No Effect**
Displacement	Raptor studies have generally found only low levels of turbine avoidance (Hötker et al. 2006; Madders & Whitfield 2006), with some species, such as kestrels, known to continue foraging activity close to turbines (Pearce Higgins	The magnitude of the effect is assessed as *Low*.	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	et.al 2009). Significant effects are not anticipated to occur or have occurred, given that extensive areas of suitable foraging habitat exists and will remain in the wider area. Kestrel were regularly observed during both winter and breeding season months during operational monitoring bird surveys. A confirmed breeding pair of kestrel were observed, approximately 600m from the Cleanrath wind farm development, in early May 2020. The results of operational phase monitoring to date have shown a broadly similar pattern of occurrence of this species within the Cleanrath wind farm development. These findings support the above assessment that no significant displacement impacts were predicted to occur or have occurred. Significant effects are not anticipated to occur or have occurred at the county, national and international scale.	The cross tablature of *Low* sensitivity species and *Low* Impact corresponds to a ***Very Low*** effect significance	
Collision	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 7-5. In addition, the ratio of predicted collisions is provided in Appendix 7-5 to demonstrate that collision risk is not uniform for this species throughout the site. The collision risk has been calculated at a ratio of 1.096 collisions per year. Annual mortality of adult kestrel has been calculated at 31% per annum (Village, 1990). The county population of kestrel is unknown however if this population is greater/equal to 355, the impacts would be negligible, i.e. an increase in background mortality of less than 1%. The National breeding	The magnitude of the effect is assessed as *Negligible.* The cross tablature of *Low* sensitivity species and *Negligible* Impact corresponds to a ***Very Low*** effect significance	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	population is c.13,500 birds (Lewis et al 2019), it is therefore reasonable to conclude that the county population is greater than 355 birds[1]. No significant effects are anticipated to occur or have occurred regarding collision risk at the county, national and international scale.		

7.9.2.7 Sparrowhawk (*All Seasons*)

Table 7-18 Impact Characterisation for Sparrowhawk based on Percival (2003) & EPA (2017)).

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	Breeding sparrowhawk were recorded during the 2016 breeding season. A confirmed nesting area with fledged chicks was located in a small area of forestry to the south and within 100m of the Cleanrath wind farm development. There was no construction activity carried out in this area, therefore direct impacts on this nesting area will not result from the Cleanrath wind farm development. Sparrowhawk were only occasionally seen foraging within the Cleanrath wind farm development. Significant areas of suitable nesting and foraging habitat remain post construction and there is an abundance of suitable habitat in the surrounding area.	The magnitude of the effect is assessed as *low.* The cross tablature of *Low* sensitivity species and *Low* Impact corresponds to a ***Very Low*** effect significance	**Long-term Slight Negative Effect**

[1] *Rationale: the national population is 13,500 for 26 counties, if the population is evenly split between counties this would mean approx. 520 birds per county. However, in reality Cork is a large county that is likely to support a larger than the average population: 520.*

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	Significant effects with respect to direct habitat loss are not predicted to have occurred at the county, national and international scale.		
Displacement	Breeding sparrowhawk were recorded during the 2016 breeding season. A confirmed nesting area with fledged chicks was located in a small area of forestry to the south and within 100m of the Cleanrath wind farm development. Construction activity adjacent to this nest may have potentially caused displacement of breeding and foraging sparrowhawk. However, none of the habitats found onsite are considered to be a scarce resource locally. Therefore, displacement effects are likely to be inconsequential. Significant effects are not anticipated to have occurred at the county, national and international scale.	The magnitude of the effect is assessed as *low*. The cross tablature of *Low* sensitivity species and *Low* Impact corresponds to a ***Very Low*** effect significance	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	**No Effect**	**No Effect**
Displacement	There will be limited impact to sparrowhawk habitat (e.g. forestry) within the Cleanrath wind farm development. The Cleanrath wind farm development does not contain habitats that are unique to the local area. Therefore, were displacement to occur it would not result in the loss of a scarce resource for the local sparrowhawk population. Significant displacement effects are not anticipated to occur or have occurred at the county, national and international scale. Sparrowhawk were only observed on two occasions during operational monitoring bird surveys between February and May 2020. One observation occurred in excess of one kilometre from the Cleanrath wind farm	The magnitude of the effect is assessed as *low*. The cross tablature of *Low* sensitivity species and *Low* Impact corresponds to a ***Very Low*** effect significance	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	development and turbine layout, while the other observation occurred within 500m of the turbine layout. The results of operational phase monitoring to date have shown a broadly similar pattern of occurrence of this species within the Cleanrath wind farm development. These findings support the above assessment that no significant displacement impacts were predicted to occur or have occurred.		
Collision	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 7-5. The collision risk has been calculated at a ratio of 0.015 collisions per year, or one collision every 66.6 years. Therefore, it is very unlikely that there have been or will be any collisions of sparrowhawk throughout the 25-year operational life of the Cleanrath wind farm development. The predicted collision risk is insignificant in the context of the county, national and international population.	The magnitude of the effect is assessed as *negligible*. The cross tablature of *Low* sensitivity species and *Negligible* Impact corresponds to a ***Very Low*** effect significance	**Long-term Imperceptible Negative Effect**

7.9.2.8 Snipe (*All Seasons*)

Table 7-19 Impact Characterisation for Snipe based on Percival (2003) & EPA (2017)).

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	Snipe were recorded within the Cleanrath wind farm development during both breeding and winter season surveys. In 2015 a maximum of three individuals were heard calling from areas of suitable breeding habitat. A breeding territory	The magnitude of the effect is assessed as *Low*.	**Long-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
	for snipe was identified in an area of upland bog in the east of the Cleanrath wind farm development during the 2016 breeding season. It is likely that there was a partial loss of snipe breeding and wintering habitat within the Cleanrath wind farm development as a result of construction works (e.g. including resulting from the new site drainage). However, the Cleanrath wind farm development footprint constitutes a small proportion (c. 9.1ha/ 1.9%) of the total Cleanrath wind farm development area. In addition, there is an abundance of suitable habitat in the surrounding area. Significant habitat loss effects are not predicted to have occurred at the county, national and international scale.	The cross tablature of *Low* sensitivity species and *Low* Impact corresponds to a ***Very Low*** effect significance	
Displacement	As previously discussed, snipe were recorded within the Cleanrath wind farm development during both breeding and winter season surveys. In 2015 a maximum of three individuals were heard calling from areas of suitable breeding habitat. A probable breeding territory for snipe was identified in area of upland bog in the east of the Cleanrath wind farm development during the 2016 breeding season. Disturbance from construction activities could have resulted in the loss of snipe breeding and wintering habitat locally. Pearce Higgins et. al (2009), found a 50% reduction in breeding density of snipe within 500m of turbines. The majority of open habitat onsite is located within 500m of turbines. There is therefore potential for a measurable reduction in breeding density of snipe to have occurred at the local scale. However, the Cleanrath wind farm development does not contain habitats that are unique to the local area nor are the open areas of the Cleanrath wind farm development of particularly high-quality breeding habitat for snipe.	The magnitude of the effect is assessed as *Low*. The cross tablature of *Low* sensitivity species and *Low* Impact corresponds to a ***Very Low*** effect significance	**Short-term Slight Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
	Significant effects are not predicted to have occurred at the county, national and international scale.		
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	**No Effect**	**No Effect**
Displacement	As previously discussed, Pearce Higgins et. al (2009), found a 50% reduction in breeding density of snipe within 500m of turbines. A 500m buffer around the turbines would cover the majority of the open habitat onsite, therefore the Cleanrath wind farm development is likely to have resulted in a measurable reduction in breeding density of snipe at the local scale. However, the Cleanrath wind farm development does not contain habitats that are unique to the local area. Therefore, were displacement to occur it would not result in the loss of a scarce resource for the local snipe population. Significant displacement effects are not anticipated to occur or have occurred at the county, national and international scale.	The magnitude of the effect is assessed as *Low*. The cross tablature of *Low* sensitivity species and *Low* Impact corresponds to a ***Very Low*** effect significance	**Long-term Slight Negative Effect**
Collision	It is acknowledged that the predicted number of transits, and hence predicted rate of collision for snipe may be underestimated, as flight activity for this species is predominantly crepuscular in nature while the VP surveys are largely diurnal (Table 1.4, SNH (2017)). 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 7-5.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of *Low* sensitivity species and *Negligible* Impact corresponds to a ***Very Low*** effect significance	**Long-term Imperceptible Negative Effect**

Analysis of potential effects during construction and operational phases of the Cleanrath wind farm development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
	The collision risk has been calculated at a ratio of 0.195 collisions per year, or one collision every 5 years. The predicted collision risk is insignificant in the context of the county, national and international population.		

7.9.3 Effects on Key Ornithological Receptors during Decommissioning

7.9.3.1 All Species

Table 7-20 Impact Characterisation for Ornithological Receptors based on Percival (2003) & EPA (2017)).

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

7.10 Effects of Grid Connection

The grid connection cable route comprises electricity cabling (33kV) from Turbine no. 7 within cable ducting along the permitted Operational Access/Inspection Road (Pl Ref. 18/04458) southwest of Turbine no. 7 and on to the local public road until it turns onto the access track of the constructed Derragh Wind Farm development and connects to the constructed 38kV electricity substation. The grid connection is approximately c15km in length. The cabling loops back out of the Derragh Wind Farm Substation (38kV) and runs mainly within the public road corridor on to the 110kV Coomataggart substation located in the townland of Grousemount, Co. Kerry. The final 1.5km of the cable route within Co. Cork and the 2km of the cabling in Co. Kerry is located on existing private access tracks.

The potential for this grid connection route to have impacted birds is discussed below.

The majority of habitats along the grid connection corridor are of low ecological value (i.e. roads and excess tracks) and do not have potential to support species of conservation interest in the area. On a precautionary basis it is assumed that some temporary displacement may have occurred during construction works. However, given the extent of suitable habitat in the wider area; significant displacement effects are not predicted to have occurred. The grid connection does not have the potential to result in any significant habitat loss or displacement of any KOR species.

As per Percival (2003) the magnitude of the effect on KOR is assessed as ***Negligible.*** The cross tablature of a *High* sensitivity species (e.g. hen harrier) and *Negligible* Impact corresponds to a ***Low*** effect significance. Hen harrier was used as an example as it is the highest sensitivity species identified as a KOR at this site. The significance of the potential impact is classed as a short-term slight negative effect following EPA criteria (2017).

7.11 Effects on Designated Areas

The Cleanrath wind farm development is not located within or directly adjacent to any Special Protection Areas (SPAs) (see Figure 7-9).

In relation to European sites, a remedial AA Screening Assessment (rAASR) and remedial Natura Impact Statement (rNIS) have been prepared to provide the competent authorities with the information necessary to complete an Appropriate Assessment for the Cleanrath wind farm development in compliance with Article 6(3) of the Habitats Directive. This section provides a summary of the key assessment findings (as assessed in the AA Screening Report and NIS) with regard to Special Protection Areas. A summary of key assessment findings (as assessed in the AA Screening Report and NIS) with regard to Special Areas of Conservation is provided in Chapter 6.

The EPA draft Guidance 2017 states:

> *"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"*.

The Article 6(3) Appropriate Assessment Screening report identified the potential for the development to have resulted in significant effects on the Special Protection Areas:

- The Gearagh SPA
- Mullaghanish to Musheramore Mountains SPA

The potential for impact on European sites has been fully assessed in the Natura Impact Statement (NIS) that has been prepared in support of the current application.

The Natura Impact Assessment concludes as follows:

> *'This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites.*
>
> *Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction and operation of the Cleanrath wind farm development has not and will not adversely affect the integrity of any European sites.*
>
> *Therefore, it can be objectively concluded that the Cleanrath wind farm development, individually or in combination with other plans or projects, has not and will not adversely affect the integrity of any European Site'*

7.12 Mitigation and Best Practice Measures

This section describes the measures that were put in place to mitigate adverse negative effects associated with the Cleanrath wind farm development on avian receptors. The mitigation measures employed during the Construction phase were in line with the previous EIS (An Bord Pleanála Planning Reference: PL. 04/246742) and associated CEMP (see Appendix 4-4).

7.12.1 Mitigation During Construction, Operation and Decommissioning

The following section describe the mitigation and best practise measures that were implemented during the construction phase and will be implemented during the operational and decommissioning phases, of the Cleanrath wind farm development.

7.12.1.1 Construction Phase Mitigation

The following measures were implemented for the construction phase:

- No felling of conifers, trees or bushes were carried out during the bird breeding season (i.e. 1st of March until the 31st of August). Felling was subject to a pre-commencement nesting bird survey by a suitably qualified ecologist to avoid impacts on nesting birds.
- Removal of brash surrounding felled areas in proximity of turbines to discourage hen harrier and other birds of prey from foraging and nesting in these areas. (CEMP - MM53)
- During the construction phase, noise limits, noise control measures, hours of operation (i.e. dusk and dawn is high faunal activity time) and selection of plant items was considered in relation to disturbance of birds.
- All plant and equipment for use were selected in compliance with the Construction Plant and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations 2001 (S.I. No. 632 of 2001).
- An Ecological Clerk of Works (ECoW) and a project ecologist was appointed for the Cleanrath wind farm development which operated for the duration of construction works. Duties included:
    - Undertake a pre-construction bird surveys to ensure that significant effects on breeding birds will be avoided, particularly hen harrier and merlin (CEMP - MX5).

- Informing and educating on-site personnel of the ornithological and ecological sensitivities within the Cleanrath wind farm development.
- Oversee management of ornithological and ecological issues during the construction period, including the implementation of the Habitat Enhancement Plan and advising on ornithological issues as they arise.
- Provide guidance to contractors to ensure legal compliance with respect to protected species onsite.
- Liaising with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress.

A Construction and Environmental Management Plan (CEMP) has been prepared. The CEMP was in place prior to the start of the construction phase. Best practice measures which form part of the design of the project are included in Chapter 4 of the rEIAR. The CEMP is included as Appendix 4-4 to Chapter 4.

7.12.1.2 Operational Phase Mitigation

No operational phase impacts requiring mitigation were identified. Operational bird monitoring is currently ongoing at the Cleanrath wind farm development.

7.12.1.3 Decommissioning Phase Mitigation

A Decommissioning Plan has been prepared (see Appendix 4-9), which will be carried out in accordance with Scottish Natural Heritage report (SNH) Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013). The following measures are proposed for the decommissioning phase:

- During the decommissioning phase, disturbance limitation measures will be as per the construction phase.
- Plant machinery will be turned off when not in use.
- All plant and equipment for use will comply with the Construction Plant and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations 2001 (S.I. No. 632 of 2001).
- A project ecologist will be appointed to oversee the decommissioning phase, with similar duties to those outlined above during the construction phase.

7.13 Monitoring

Pre-commencement and post construction surveys have been undertaken at the Cleanrath wind farm development. The details of the surveys undertaken are discussed below, the results are report in Section 7.5 and have informed the assessment undertaken in Section 7.9.

7.13.1 Commencement and Pre-Construction Monitoring

Construction works commenced outside the bird nesting season (1st of March to 31st of August inclusive) in September 2018. Pre-commencement surveys were undertaken immediately prior to the initiation of works at the wind farm. Bird survey were undertaken in June, July and August 2018. The survey involved a thorough walkover survey to a 500m radius of the development footprint, where access allowed. In addition, breeding raptor survey were undertaken to a 2km radius of the Cleanrath wind farm development.

All construction works were undertaken in compliance with the Wildlife Act.

7.13.2 Post Construction Monitoring

A detailed post-construction Bird Monitoring Programme was prepared for the operational phase of the Cleanrath wind farm development and is presented in Appendix 7-6. Operational monitoring at the Cleanrath wind farm development commenced in January 2020 and continued into May 2020. Due to time sensitivity of the application it was not possible to process, digitise and incorporate the results from June and July 2020 in the assessment. June and July surveys have been completed and August operational monitoring has since commenced with the view to continuing surveying up to the time of the board's decision, and beyond should consent be granted, to ensure no lapse in surveys. The programme of works monitored and will continue to monitor parameters associated with collision, displacement/barrier effects and habituation during the lifetime of the project. Surveys commenced in January 2020 of Years 1. Thereafter surveys will be scheduled to coincide with Years 2, 3, 5, 10 and 15 of the lifetime of the wind farm. Monitoring measures were broadly based on guidelines issued by the Scottish Natural Heritage (SNH, 2009). Post construction monitoring included and will include the following surveys:

- Flight activity surveys: Vantage Point Surveys
- Breeding Bird Surveys: Adapted Brown & Shephard.
- Winter Walkover Surveys
- Breeding Raptor surveys
- Hen Harrier Winter Roost Surveys
- Targeted bird collision surveys (corpse searches) were/will be undertaken with training dogs. The surveys included detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust.

7.14 Residual Effects

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

- Hen Harrier (Wintering)
- Golden Plover (Wintering)
- Chough (All Seasons)
- Merlin (All Seasons)
- Peregrine (All Seasons)
- Kestrel (All Seasons)
- Sparrowhawk (All Seasons)
- Snipe (All Seasons)

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

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

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

7.15 Assessment of Cumulative Effects

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

- **Additive** (i.e. a multiple independent additive model)

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

7.15.1 Other Projects

Assessment material for this in-combination impact assessment was compiled on the relevant developments within the vicinity of the Cleanrath wind farm development. The material was gathered through a search of relevant online Planning Registers, reviews of relevant EIS/EIAR documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts. The projects considered in relation to the potential for in combination effects and for which all relevant data was reviewed (e.g. individual EISs/EIARs, layouts, drawings etc.) include those listed below and in Table 2-3 in Chapter 2.

7.15.2 Projects Considered in the Cumulative Impact Assessment

A review of the Planning Register for Kerry and Cork County Council's, as well as An Bord Pleanála planning register, show that there has been a number of planning applications lodged within the vicinity of the Cleanrath wind farm development. While planning applications lodged within the study area primarily relate to one-off housing or are agricultural in nature, there are a number of previous and ongoing applications for wind farm development and associated infrastructure. Further details on these applications are available below.

The projects considered in relation to the potential for cumulative impacts are provided in Section 2.6.2 of rEIAR Chapter 2.

Forestry and Agricultural Practices

The areas within the site and some of the surrounding area includes large tracts of commercial forestry and agricultural land. The forestry works (felling/planting) associated with the forestry in the wider surroundings of the Cleanrath wind farm development will be subject to relevant licencing and guidance from the Forestry Service. These practices have been taken into account in this cumulative assessment. Significant cumulative or in-combination effects are not predicted.

Other Developments

The review of the Cork and Kerry County Councils and An Bord Pleanála planning register documented relevant general development planning applications in the vicinity of the Cleanrath wind farm development, most of which relate to the provision and/or alteration of one-off rural housing and agriculture-related structures. Owing to the nature and scale of these developments significant cumulative or in-combination effects are not predicted.

Other Wind Farm Developments

The wind farm projects within a 20-kilometre radius of the Cleanrath wind farm development are provided in Table 7-21 below and are presented in terms of whether the project is permitted, existing or under construction. A total of 26 wind farms, and 226 existing/permitted/under construction turbines fall within a 20-kilometre radius of the proposal as detailed in Table 7-21. A map of these wind farms is provided in Chapter 13 Figure 13-6.

Table 7-21 Wind Farms within 20km of the development site

Wind Farm	County	Status	No. of Turbines
Up to 5km			
Derragh (Ref. 12/5270)	Cork	Existing	6
5km to 10km			
Shehy More (Ref. 13/551)	Cork	Under Construction	11
Carrigarierk (Ref. 15/730)	Cork	Under Construction	5
Sillahertane/Coomagearlaghy II (Ref. 03/1359, 13/551)	Kerry	Existing	10
Midas (Ref. 03/1188, Ref. 01/3571, Ref. 02/719)	Kerry	Existing	23
Grousemount &Barnastooka (Ref. 10/197 & Ref. 15/262)	Kerry	Existing	38
10 to 15km			
Bawnmore 2 (Ref. 07/4102)	Cork	Existing	6
Caherdowney (Ref. 03/3079)	Cork	Existing	4
Clydraghroe (Ref. 04/3152, 07/306)	Kerry	Existing	3
Clydraghroe/Cummeenabuddoge (Ref. 06/1680)	Kerry	Existing	2
Clydraghroe Extension (Ref. 10/1302)	Kerry	Permitted	1
Coomacheo (Ref. 03/1997)	Cork	Existing	15
Coomagearlaghy-Kilgarvan (Ref.02/1241 & 03/2306)	Kerry	Existing	15
Curragh (Ref. 07/10105)	Cork	Existing	8
Garranereagh (Ref. 10/5711)	Cork	Existing	4
Gneeves Existing (Ref. 99/0616, Ref. 03/6585)	Cork	Existing	11

Wind Farm	County	Status	No. of Turbines
Gneeves Extension (Ref. 04/188, Ref. 13/5717)	Cork	Permitted	3
Inchicoosh (Ref. 07/1605)	Kerry	Existing	6
Knocknamork (Ref. 19/4972)	Cork	Permitted	7
Lettercannon (Ref.03/2508)	Kerry	Existing	7
15km to 20km			
Bawnmore (Ref. 01/6529)	Cork	Existing	5
Derreenacrinnig West (Ref. 10/857)	Cork	Permitted	7
Dromleena (Ref. 09/384)	Cork	Permitted	11
Kilvinane (Ref. 01/980)	Cork	Existing	3
Knockeenboy (Ref. 11/59)	Cork	Permitted	6
Millane Hill (Ref. 98/1482)	Cork	Existing	9
TOTAL EXISTING TURBINES			175
TOTAL TURBINES PERMITTED/ UNDER CONSTRUCTION			51

SNH guidance on *Assessing the Cumulative Impacts of onshore Wind Energy Developments* (2012 and 2018), was consulted when undertaking cumulative assessment. SNH (2012 and 2018) emphasises that the main concern of SNH is to 'maintain the conservation status of the species population at the national level.' However, it is acknowledged that consideration should also be allowed for impacts at the regional level, 'where regional impacts have national implications (for example where a specific region holds the majority of the national population)'. A 10km radius of the Cleanrath wind farm development was considered an appropriate regional scale given the foraging range of the key ornithological receptors identified within the Cleanrath wind farm development. For example, the maximum foraging range of golden plover is c. 5-8km (Fuller and Youngman, 1979). Peregrine falcon foraging range can on occasion reach a maximum of 18km however it is typically considerably less, i.e. the core foraging range is 2km (SNH, 2016).

There was only one wind farm within 5km of the Cleanrath wind farm development (i.e. Derragh Wind Farm), with a further five wind farms located between 5km and 10km of the site. There was a total of 71 existing turbines across the seven windfarms and a further 16 turbines which are currently under construction.

The following wind farms within 10km of the Cleanrath wind farm development were considered in further detail.

- **Derragh Wind Farm, Co. Cork**

Derragh Wind Farm is situated west-northwest, approximately 1.7km, from the Cleanrath wind farm development. The EIS was consulted to determine cumulative impacts from the development site. The EIS concluded that "*the extent of habitat loss is less than 1% of the total area of the site. The habitats that will be affected are of low ecological value and the overall impact of the loss of these habitats are negligible*." No wintering or breeding birds of high conservation concern were recorded on the development. It was therefore predicted that the development would have no significant impacts on bird populations.

No significant residual effects on avian receptors were identified.

Based on the information available in the Derragh Wind Farm EIS, significant cumulative impacts are not anticipated to occur or have occurred.

- **Shehy More Wind Farm, Co. Cork**

Shehy More Wind Farm is the next closest wind farm to the Cleanrath wind farm development, situated approximately 6km to the southwest. The EIS was consulted to determine cumulative impacts from the development site. The EIS outlined that "*no species listed in the BoCCI Red list were recorded during the bird survey work*." Hen Harrier, Golden Plover and Chough (Annex I; EU Birds Directive) were occasionally recorded on site or in its vicinity, in low numbers. the nature of the habitat on site, i.e. conifer plantation, were widespread and abundant within the surrounding areas resulting in a predicted low effect significance for both habitat loss and displacement for all bird species within the development site. It was therefore predicted that the site would have no significant impacts on bird populations. It was concluded that "*in the longer term, the cumulative impact of wind energy developments (both in Counties Cork and Kerry and in the state as a whole) may contribute to the amelioration of climate change events that threaten to make the Hen Harrier and other upland birds as breeding birds in the Republic of Ireland*."

Based on the information available in the Shehy More Wind Farm EIS, significant cumulative impacts are not predicted to occur or have occurred.

- **Carrigarierk Wind Farm, Co. Cork**

Carrigarierk Wind Farm is situated directly south, approximately 6.3km, from the Cleanrath wind farm development. The EIS was consulted to determine cumulative impacts from the development site. Species recorded at the Carrigarierk Wind Farm site included hen harrier, golden plover, peregrine and kestrel. Significant impacts were not predicted for bird species at the site, with no greater than a long-term slight negative (EPA, 2017) identified.

No significant residual effects on avian receptors were identified.

Based on the information available in the Carrigarierk Wind Farm EIS, significant cumulative impacts are not predicted to occur or have occurred.

- **Sillahertane/Coomagearlaghy II Wind Farm, Co. Kerry**

Sillahertane/Coomagearlaghy II Wind Farm is situated approximately 9km to the west of the Cleanrath wind farm development. The EIS was consulted to determine cumulative impacts from the development site. The EIS concluded that "*with the exception of one turbine which is sited in a small area of cutover peatland, all turbines are proposed to be sited in the newly planted coniferous plantation or its associated fire breaks. These areas are of low habitat value. The choice of these locations will ensure that peatland hydrology or wildlife will not be adversely affected by the development*." It was anticipated that the proposed development consisting of ten turbines on solid tubular steel towers located in commercially planted and degraded areas would have no significant impact on the flora and fauna of the area.

No significant residual effects on avian receptors were identified.

Based on the information available in the Sillahertane/Coomagearlaghy II Wind Farm EIS, significant cumulative impacts are not predicted to occur or have occurred.

Midas Wind Farm, Co. Kerry

The potential for the Cleanrath wind farm development to have resulted in significant cumulative or in combination effects when assessed alongside Midas Wind farm, which is c. 9km from the Cleanrath wind farm development, was considered. The planning file was reviewed on the Kerry County Council Planning Register and no information regarding potential effects on bird species was available. However, given the location of the Midas Wind Farm, the nature of the habitats on that site (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with the Cleanrath Wind Farm when considered on its own, significant cumulative or in-combination effects are not predicted to occur or have occurred.

Taking into consideration the effect significance levels identified for the Cleanrath wind farm development (i.e. no effect significance of greater than Low (Percival 2003) or Slight Negative (EPA 2017)), significant cumulative effects on KORs with regard to direct habitat loss, displacement or collision mortality are not anticipated to occur or have occurred.

Grousemount Wind Farm, Co. Kerry

Grousemount Wind Farm is located approximately 9km to the west of the Cleanrath wind farm development. Two EIS/EIAR were consulted to determine cumulative impacts from the development site, one lodged in 2010 which was refused but gives access to survey results and the second lodged to An Bord Pleanála granted in 2015.

The 2010 EIS concluded that "the loss of relatively small amounts of habitat due to the proposed development would not be expected to have any significant impacts on the populations of any of the bird species that currently frequent the site or its surroundings." There was no evidence to show that the site was within a regularly used migration route by birds or a route used by wintering waterfowl. Furthermore, from the area's location and topography there was no reason to believe it would be used by significant numbers of migrating birds or waterfowl. High concentrations of birds were not recorded on or near the windfarm during surveys. The presence of turbines was not expected to have any effects on Birds of Conservation Importance recorded on Grousemount site (i.e. Chough, Red Grouse, Peregrine, Hen Harrier and Golden Plover). Therefore, the possibility of an impact by disturbance on migrating birds was disregarded.

The Inspector's Report from An Bord Pleanála focuses, on a precautionary approach, on White-tailed Eagles flying over site. However, survey results showed that the site is not used on a regular basis and there is no flight path over the site (i.e. between feeding and roosting sites). Furthermore, it highlights the absence of suitable breeding habitat for the species on site. The report concludes that *"the proposed development would not have a significant adverse effect on any sensitive habitats, protected species or areas of nature conservation interest within the site or the surrounding area subject to the full implementation of mitigation measures and planning conditions. The proposed development would not give rise to any significant adverse cumulative impacts in-combination with other windfarms, the grid connection route, or plans and projects in the area."*

Based on the information available in the Grousemount EIS and the An Bord Pleanála's Inspector's Report, significant cumulative impacts are not predicted to occur or have occurred. No significant residual effects on avian receptors were identified.

Taking into consideration the effect significance levels identified for the Cleanrath wind farm development (i.e. no effect significance of greater than Low (Percival 2003) or Slight Negative (EPA

2017)), significant cumulative effects on KORs with regard to direct habitat loss, displacement or collision mortality are not predicted.

The following section includes a detailed assessment of cumulative effects for each key ornithological receptor.

7.15.3 Assessment of Cumulative Effects

There were eight key ornithological receptors identified at the Cleanrath wind farm development: hen harrier, golden plover, chough, merlin, peregrine falcon, kestrel, sparrowhawk and snipe. Following the guidance of SNH (2012), the cumulative impact assessment has been carried out at the scale of the importance rating of the receptor. The populations recorded at the Cleanrath wind farm development were all assessed as of local importance (higher level). The only exception being hen harrier (international/national importance) and chough (county importance). For the purposes of the cumulative assessment the local scale is considered to be within a 5km radius of the Cleanrath wind farm development. As previously discussed, there was only one wind farm within 5km of the Cleanrath wind farm development (i.e. Derragh Wind Farm), with a further six wind farms located between 5km and 10km of the site. The assessment of cumulative effects on key ornithological receptors is provided in Table 7-22 below.

Table 7-22 Assessment of cumulative effects on key ornithological receptors

KOR	Evaluation of Cumulative Impacts	Determination
Hen Harrier (International/ national Importance)	This assessment is informed by a review of national pressures and threats, as reported (2008-2012) under Article 12 of the Birds Directive (Directive 2009/147/EC). At the national level '*renewable abiotic energy*' has been identified as a *'medium importance'* pressure on the species. In the present case, the Cleanrath wind farm development is located in Co. Cork, the local uplands are not considered to have a particularly high density of wind farms, e.g. there is only one wind farm within a 5km radius of the Cleanrath wind farm development and a further five within a 10km radius. Of the six wind farms located within a 10km radius of the Cleanrath wind farm development, no significant impacts on hen harrier were identified. Taking into consideration the above reported effects and the predicted effects with the Cleanrath Wind Farm, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.	Significant cumulative impacts are not predicted to occur or have occurred at the county, national or international scale.
Golden Plover (Local Importance)	The potential for local developments to have resulted in significant cumulative or in combination effects when assessed alongside Cleanrath Wind Farm was considered. Golden plover were not recorded during pre-planning surveys of the nearby Derragh WF. The majority of the Derragh WF was a commercial	Significant cumulative impacts are not predicted to occur or have occurred at

KOR	Evaluation of Cumulative Impacts	Determination
	forestry plantation a habitat type of no ecological value to golden plover. Given no impacts were predicted from the Derragh WF, it cannot have contributed to any cumulative effect with the Cleanrath wind farm development. Of the six wind farms located within a 10km radius of the Cleanrath wind farm development, no significant impacts on this species were identified. Taking into consideration the above reported effects and the predicted effects with the Cleanrath Wind Farm, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.	the county, national or international scale.
Chough (County Importance)	This species is predominantly found in coastal areas on the southwest coast of Ireland where it breeds on cliff faces, caves etc. Given the optimal habitat for this species in the south-west is located along the coast, the potential for cumulative impacts to result for a small number of birds from wind farms (that are mainly located at inland sites) is unlikely to result in significant impacts for this species. Of the six wind farms located within a 10km radius of the Cleanrath wind farm development, no significant impacts on chough were identified. Taking into consideration the above reported effects and the predicted effects with the Cleanrath Wind Farm, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.	Significant cumulative impacts are not predicted to occur or have occurred at the county, national or international scale.
Merlin (Local Importance)	The potential for local developments to have resulted in significant cumulative or in combination effects when assessed alongside Cleanrath Wind Farm was considered. Merlin were not recorded during pre-planning surveys of the nearby Derragh WF. Given no impacts were predicted from the Derragh WF, it cannot have contributed to any cumulative effect with the Cleanrath wind farm development. Of the six wind farms located within a 10km radius of the Cleanrath wind farm development, no significant impacts on this species were identified.	Significant cumulative impacts are not predicted to occur or have occurred at the county, national or international scale.

KOR	Evaluation of Cumulative Impacts	Determination
	Taking into consideration the above reported effects and the predicted effects with the Cleanrath Wind Farm, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.	
Peregrine (Local Importance)	The potential for local developments to have resulted in significant cumulative or in combination effects when assessed alongside Cleanrath Wind Farm was considered. The nearby Derragh Wind Farm EIS does not note any significant impacts on this species. In summary the EIS concludes: • that this species was only recorded once and that the wider surroundings '*provide ample suitable breeding habitat*.' • It was noted that '*the potential for disturbance and displacement of birds of prey at the site is considered to be low.'* • A qualitative assessment of collision risk was undertaken, and significance of the effect was considered to be low. Of the six wind farms located within a 10km radius of the Cleanrath wind farm development, no significant impacts on this species were identified. Taking into consideration the above reported effects and the predicted effects with the Cleanrath Wind Farm, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.	Significant cumulative impacts are not predicted to occur or have occurred at the county, national or international scale.
Kestrel (Local Importance)	The potential for local developments to have resulted in significant cumulative or in combination effects when assessed alongside Cleanrath Wind Farm was considered. The nearby Derragh Wind Farm EIS does not note any significant impacts on this species. In summary the EIS concludes: • *The magnitude of effect of a wind farm on birds of prey at this location will be Negligible as there will be less than 1% habitat loss of suitable habitat for birds of prey'.*	Significant cumulative impacts are not predicted to occur or have occurred at the county, national or international scale.

KOR	Evaluation of Cumulative Impacts	Determination
	• It was noted that '*the potential for disturbance and displacement of birds of prey at the site is considered to be low.'* • A qualitative assessment of collision risk was undertaken and significance of the effect was considered to be low. Of the six wind farms located within a 10km radius of the Cleanrath wind farm development, no significant impacts on this species were identified. Taking into consideration the above reported effects and the predicted effects with the Cleanrath Wind Farm, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.	
Sparrowhawk (Local Importance)	The potential for local developments to have resulted in significant cumulative or in combination effects when assessed alongside Cleanrath Wind Farm was considered. The nearby Derragh Wind Farm EIS does not note any significant impacts on this species. In summary the EIS concludes: • *The magnitude of effect of a wind farm on birds of prey at this location will be Negligible as there will be less than 1% habitat loss of suitable habitat for birds of prey'.* • It was noted that '*the potential for disturbance and displacement of birds of prey at the site is considered to be low.'* • A qualitative assessment of collision risk was undertaken and significance of the effect was considered to be low. Of the six wind farms located within a 10km radius of the Cleanrath wind farm development, no significant impacts on this species were identified. Taking into consideration the above reported effects and the predicted effects with the Cleanrath Wind Farm, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.	Significant cumulative impacts are not predicted to occur or have occurred at the county, national or international scale.

KOR	Evaluation of Cumulative Impacts	Determination
Snipe (Local Importance)	The potential for local developments to have resulted in significant cumulative or in combination effects when assessed alongside Cleanrath Wind Farm was considered. The nearby Derragh Wind Farm EIS does not note any significant impacts on this species. In summary the EIS concludes: • The significance of the change in habitat for waders as a result of the construction of the windfarm is considered *Negligible*. • The potential for disturbance and displacement of waders is considered to be *Negligible.* • A qualitative assessment of collision risk was undertaken and significance of the effect was considered to be low. Of the six wind farms located within a 10km radius of the Cleanrath wind farm development, no significant impacts on this species were identified. Taking into consideration the above reported effects and the predicted effects with the Cleanrath Wind Farm, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.	Significant cumulative impacts are not predicted to occur or have occurred at the county, national or international scale.

7.16 Conclusion

Following consideration of the residual effects (post mitigation) it is concluded that the Cleanrath wind farm development has not predicted and will not result in any significant effects on any of the identified KORs. No significant effects on receptors of International, National or County Importance were identified.

Given the Cleanrath wind farm development was constructed and operated in accordance with the design, best practice and mitigation that is described within this document, significant individual or cumulative effects on ornithology will not occur or have not occurred at the international, national or county scales. Similarly, the current period of sleep mode, and any future full operation and decommissioning has been assessed in this chapter and no potential for significant individual or cumulative effects at the international, national or county scales has been identified.