

## 7. ORNITHOLOGY

### 7.1 Introduction

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

This chapter is supported by Technical Appendices 7.1 to 7.9. Appendix 7.1 gives a detailed list of all species recorded on site as well as outlining target and non-target species. Appendix 7.2 contains details on survey effort, survey times and weather conditions while Appendix 7.3 contains summary tables outlining the abundance and monthly distribution of species recorded during various survey methods. Appendix 7.4 contains the raw survey data from the core two-year survey period (October 2017 – September 2019), as well as Figures displaying the locations of each observation for the Target species. Appendix 7.5 contains confidential records on an ecologically sensitive species (red-necked phalarope). Appendix 7.6 contains the Collision Risk Assessment document which illustrates how the Collision Risk Modelling was undertaken for this site. Appendix 7.7 contains seasonal survey reports from Biosphere Environmental Services (BES) at the development site, between the period of October 2014 and March 2018, prior to MKO surveys which commenced in April 2018. Appendix 7.8 contains the proposed Habitat Enhancement Plan. Appendix 7.9 contains the proposed Post-Construction Bird Monitoring Programme. The proposed development area, core EIAR site boundary and areas surveyed are provided in Figures 7.1 - 7.9.

The chapter is structured as follows:

- The Introduction provides a description of the Proposed Development and the relevant legislation, guidance and policy context regarding ornithology.
- This is followed by a comprehensive description of the ornithological 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 Proposed Development: construction, operational and decommissioning. Potential cumulative effects in combination with other projects are fully assessed.
- Proposed 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 proposed mitigation and best practice measures.
- The conclusion provides a summary statement on the overall significance of predicted effects on ornithology.

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

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

## 7.1.1 Description of the Proposed Development

The proposed development comprises 21 no. turbines with an overall blade tip height of up to 185 metres above the top of foundation, a substation and all ancillary infrastructure. A detailed description of the Proposed Development is included in Chapter 4 of this EIAR.

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

## 7.1.2 Legislation, Guidance and Policy Context

This EIAR 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 2018.
- 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.
- Offaly County Council (2014). Offaly County Development Plan 2014-2020.
- EPA (2017). *Draft revised guidelines on the information to be contained in Environmental Impact Assessment Reports*. Environmental Protection Agency.
- EPA (2015). *Draft Revised 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. Pdraig 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 EIAR. The scope of works and survey methodology was devised by Biosphere Environmental Services (BES) (October 2017 to March 2018) and by Senior Ornithologist, Mr. Alex Ash (BSc.) (April 2018 to September 2019) and is fully compliant with recent SNH guidance. The chapter has been reviewed by Pat Roberts (B.Sc. Environmental Science) and John Hynes (B.Sc., M.Sc., MCIEEM).

Field surveys were undertaken by John Hehir (BSc.), Tom Ryan (BSc.), Joe Kelly (BSc.), Patrick Manley (BSc.), Paul Troake, Dr Brian Madden (PhD) (BES), Shane O'Neill (BES) and Joe Adamson (BES). All of the surveyors listed above are competent experts for the purposes of the preparation of this EIAR and suitably qualified.

The survey methodologies underlined in this EIAR chapter have been peer reviewed by Dr Tom Gittings. Dr Gittings has been trading as an independent ecological consultant since 2001. He has over 18 years' experience as a professional ecologist and is a full member of the Chartered Institute of Ecology and Environmental Management.

## 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 make use of the study area. The assessment included a thorough review of the available ornithological data including:

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

### 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 EIAR scoping to inform the current assessment. Full details can be found in Section 2.6 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 2.1 of this EIAR. The recommendations of the consultees have informed the EIAR preparation process and the contents of this chapter. Table 2.3 in Chapter 2 of this EIAR describes where the comments raised in the scoping responses received have been addressed in this assessment.

Table 7-1 Consultation Responses

|    | Consultee                                      | Response   | Issues Raised  | Action Required   |
|----|--|--|--|---|
| 01 | An Taisce                                      | No Response Received                               | N/A  | N/A   |
| 02 | BirdWatch Ireland                              | Response Received 8 <sup>th</sup> of November 2019 | Scoping letter received by BWI and forwarded on to Policy Officer. | N/A   |
| 03 | Department of Agriculture, Food and the Marine | Response Received 23 <sup>rd</sup> of July 2019    | Felling Licence required if tree felling will be undertaken        | No felling will be undertaken   |
| 04 | Irish Peatland Conservation Council            | Response Received 8 <sup>th</sup> of November 2019 | Requested a Bord na Móna Rehabilitation Plan                       | Rehabilitation Plan undertaken (see Appendix 6-8 Derrinlough Rehabilitation Plan) |

|    | 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 30 <sup>th</sup> of December 2019 | See Section 7.4.5 in this Chapter | See Section 7.4.5 in this Chapter |

### 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 Proposed Development was derived. The observation/survey work carried out on the site was specifically designed to survey for these identified target species in accordance with SNH guidance (2017). The target species list (see Appendix 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 Biosphere Environmental Services (BES) between October 2014 and March 2018 in the form of Vantage Point surveys and walked transects. Field surveys at Derrinlough were undertaken by MKO between April 2018 and September 2019 which included a range of various distribution and abundance surveys for targeted species as well as continuation of the Vantage Point Surveys.

Survey data gathered during the survey period October 2017 - September 2019 forms the core dataset for the assessment of effects on ornithology. It is supplemented by additional data derived from surveys undertaken on the site by BES between October 2014 and September 2017. 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 subject site. Field survey methodologies have been 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 reconnaissance site visits, the likely importance of the study area for bird species was ascertained. Based on the collated information available from the above preliminary assessment and adopting a precautionary approach, a site-specific scope for the ornithological survey was developed.

### 7.2.4.2 Survey Methodologies

The survey work undertaken between October 2017 and September 2019 forms the core dataset for the assessment of effects on ornithology. Surveys from the period October 2017 to March 2018 were undertaken by Biosphere Environmental Services (BES). Surveys from the period April 2018 to September 2019 were undertaken by McCarthy Keville O'Sullivan (MKO).

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 October 2017 to September 2019. Surveys were conducted monthly throughout this survey period from ten fixed point vantage points (VP1 – VP10) to allow comprehensive coverage to a 500m radius of the outermost proposed 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 by a recce visit and field surveys. Figure 7.1 shows the locations of all vantage points relative to the development site.

#### Viewshed Analysis

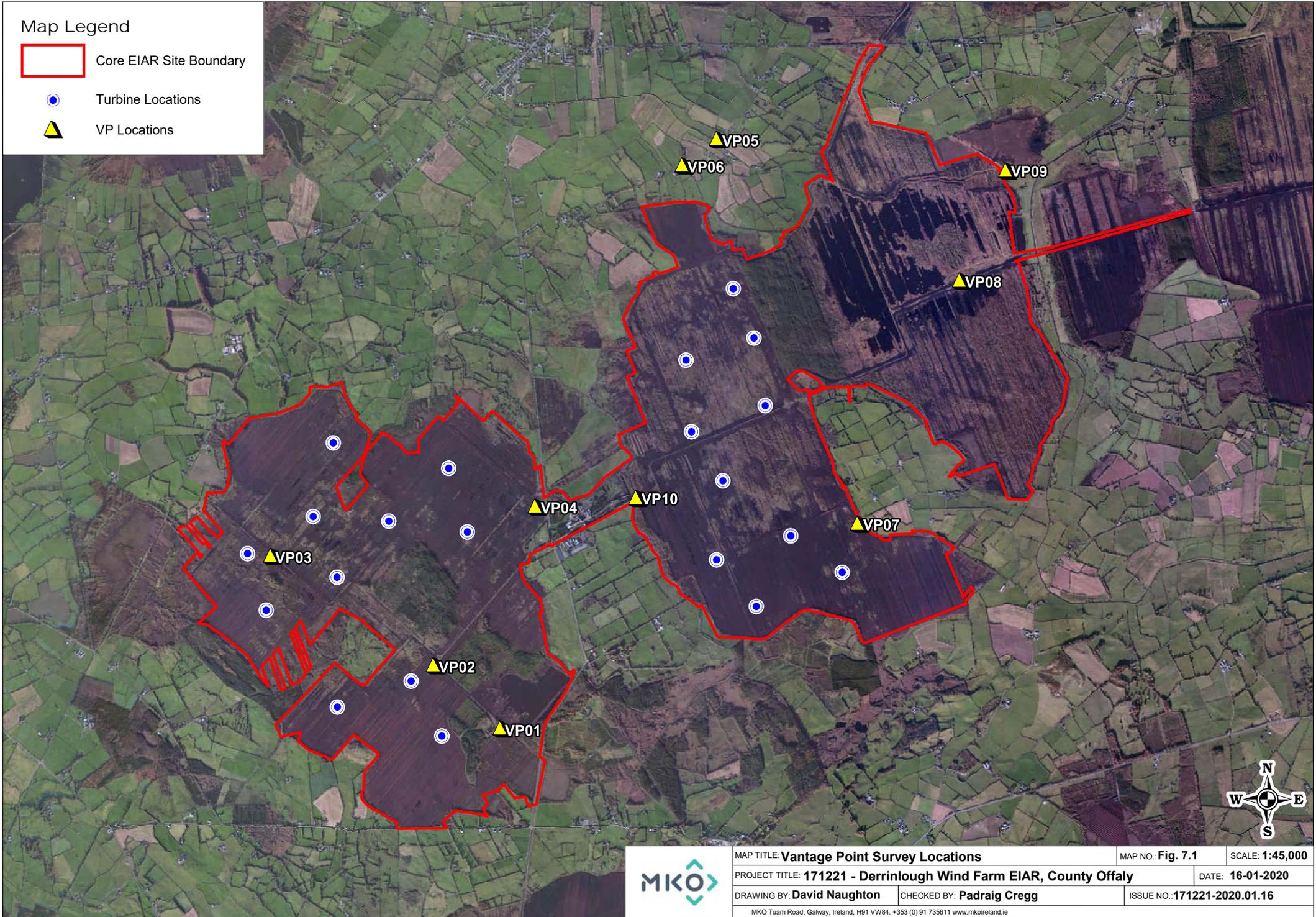
Viewshed analysis was carried out to confirm coverage of the study area from fixed vantage point locations (i.e. VP1 – VP10). Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with Mapinfo Professional (Version 10.0) using a notional layer suspended at 25m, which is representative of the minimum height considered for the Potential Collision Risk Area based on a worst-case scenario turbine model. 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 cover the 500 m Survey Area to ground level, when truncated at 2km and all airspace out to 2km and beyond was visible.

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. Using the ZTV software, a viewshed of 360 degrees was produced calculating an area 25 metres from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180 degrees to give the viewshed from each VP location in line with SNH (2014, 2017). At the time of selection for VPs

Map Legend

-  Core EIAR Site Boundary
-  Turbine Locations
-  VP Locations



|  |                                  |                                     |
|--|----------------------------------|-------------------------------------|
| MAP TITLE: <b>Vantage Point Survey Locations</b>   | MAP NO.: <b>Fig. 7.1</b>         | SCALE: <b>1:45,000</b>              |
| PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                       | DATE: <b>16-01-2020</b>          |                                     |
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the turbine locations, turbine model or swept heights were not known. The final turbine layout was received in November 2018, which was subsequently reviewed against the Viewshed Analysis to ensure that survey coverage was efficient.

In order to review the viewshed coverage from the VP locations and ensure that the viewsheds provided sufficient coverage of the proposed turbines and 500m of same, a 500m buffer was applied to the outer most turbines of the proposed wind farm development in line with SNH (2014, 2017). The viewshed analysis offers the best possible views of the study area with adequate coverage of the proposed turbine layout, using as few VPs as possible. The visible view shed at 25m is presented on Figures 7.2, 7.2.1, 7.2.2, 7.2.3, 7.2.4, 7.2.5, 7.2.6, 7.2.7, 7.2.8, 7.2.9, 7.2.10.

### Data Recording and Digitisation

Data on bird observations and flight activity was collected from a scanning arc of 180° and a 2km radius by an observer at each fixed location for six hours per month (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 |
|---------------------------------------|---------|-----------------------|
| 2017/2018 Non-Breeding Season (10VPs) | Oct-Mar | 36 hours/VP*          |
| 2018 Breeding Season (10VPs)          | Apr-Sep | 36 hours/VP           |
| 2018/2019 Non-Breeding Season (10VPs) | Oct-Mar | 36 hours/VP           |
| 2019 Breeding Season (10VPs)          | Apr-Sep | 36 hours/VP           |

\* With the exception of VP8 during the 2017/18 Winter Season; this VP was surveyed for a total of 35 hours.

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. Observed flight activity was recorded as per defined flight bands which were chosen in relation to the dimensions of potential turbine models for the site. Bands were split into 0-10m, 10-25m, 25m-175m and 175m+. All flight activity within the height bands 25-175m and 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 turbine modelling.

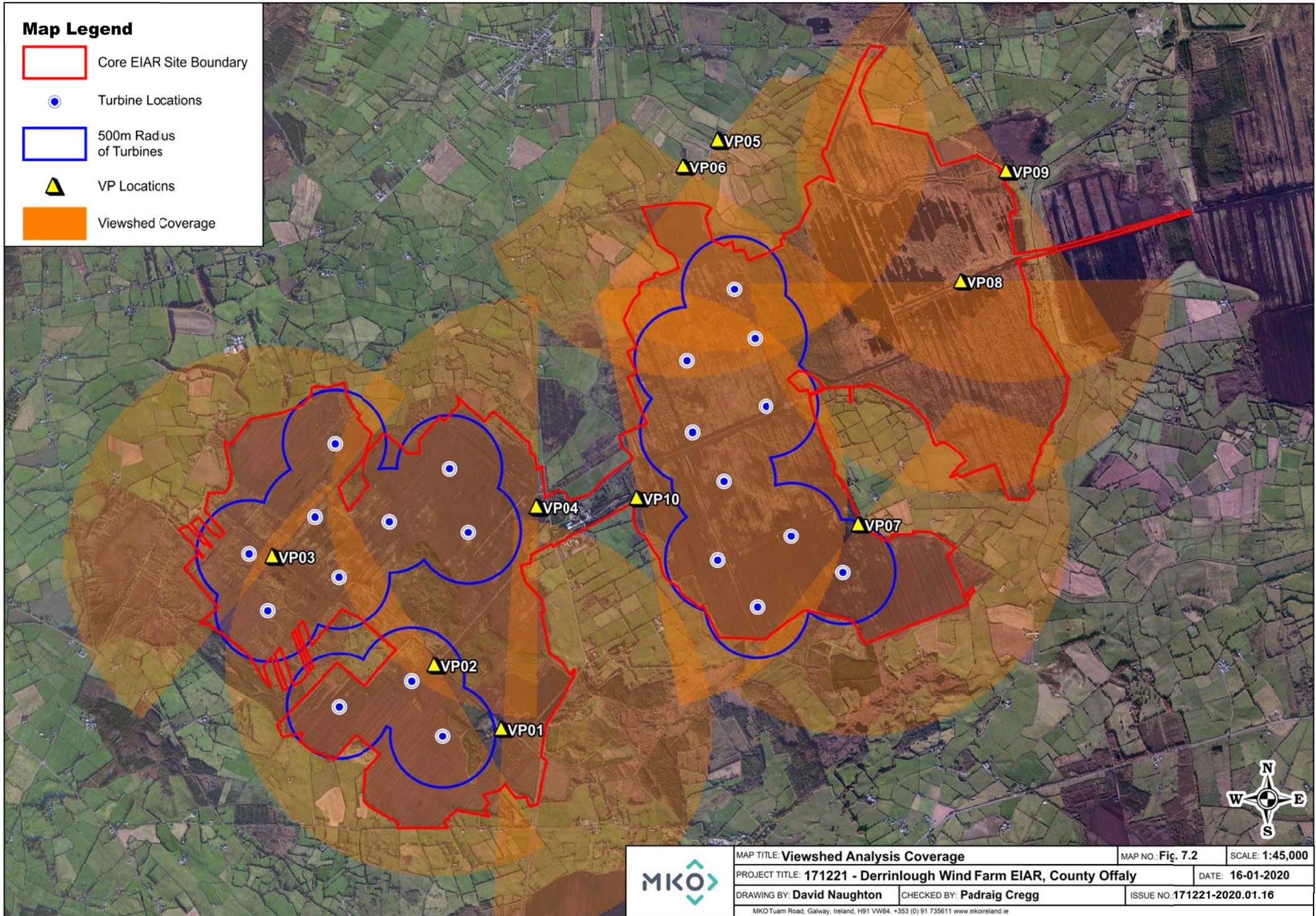
Each flight observation was assigned a unique identifier when mapped in the field and subsequently digitised using GIS software.

#### 7.2.4.2.2 Breeding Bird Surveys (O'Brien and Smith Methodology)

Breeding walkover transect 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. Survey methodology followed the O'Brien and Smith method for lowland sites as outlined in Gilbert et al. (1998) and SNH (2017) ('The O'Brien and Smith (1992) method for censusing lowland breeding wader populations'). The survey area extended 500m beyond the site boundary as recommended by SNH (2017).

### Map Legend

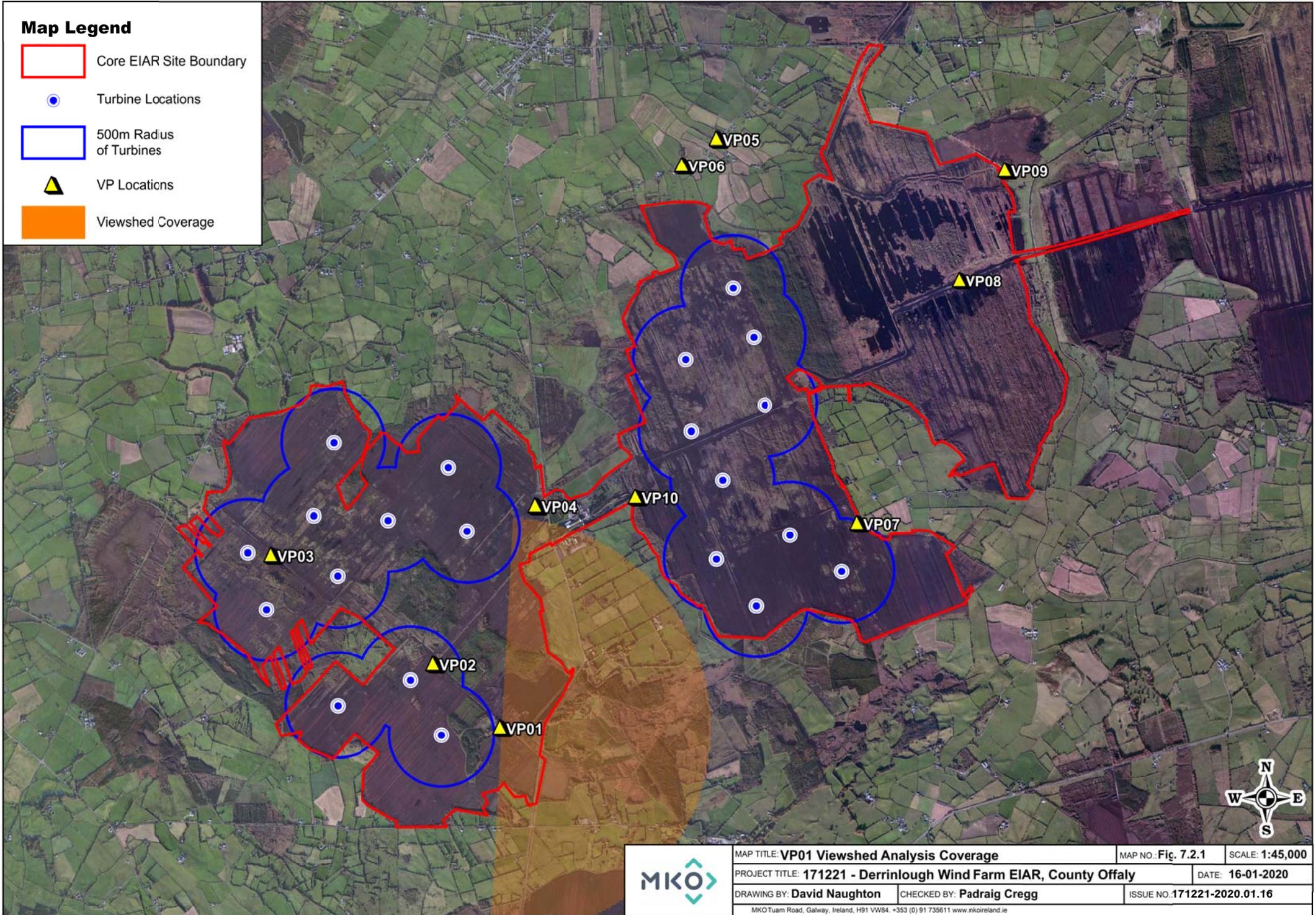
-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



|   |                                  |                                    |
|---|----------------------------------|------------------------------------|
| MAP TITLE: <b>Viewshed Analysis Coverage</b>  | MAP NO.: <b>Fig. 7.2</b>         | SCALE: <b>1:45,000</b>             |
| PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>16-01-2020</b>          |                                    |
| DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO. <b>171221-2020.01.16</b> |
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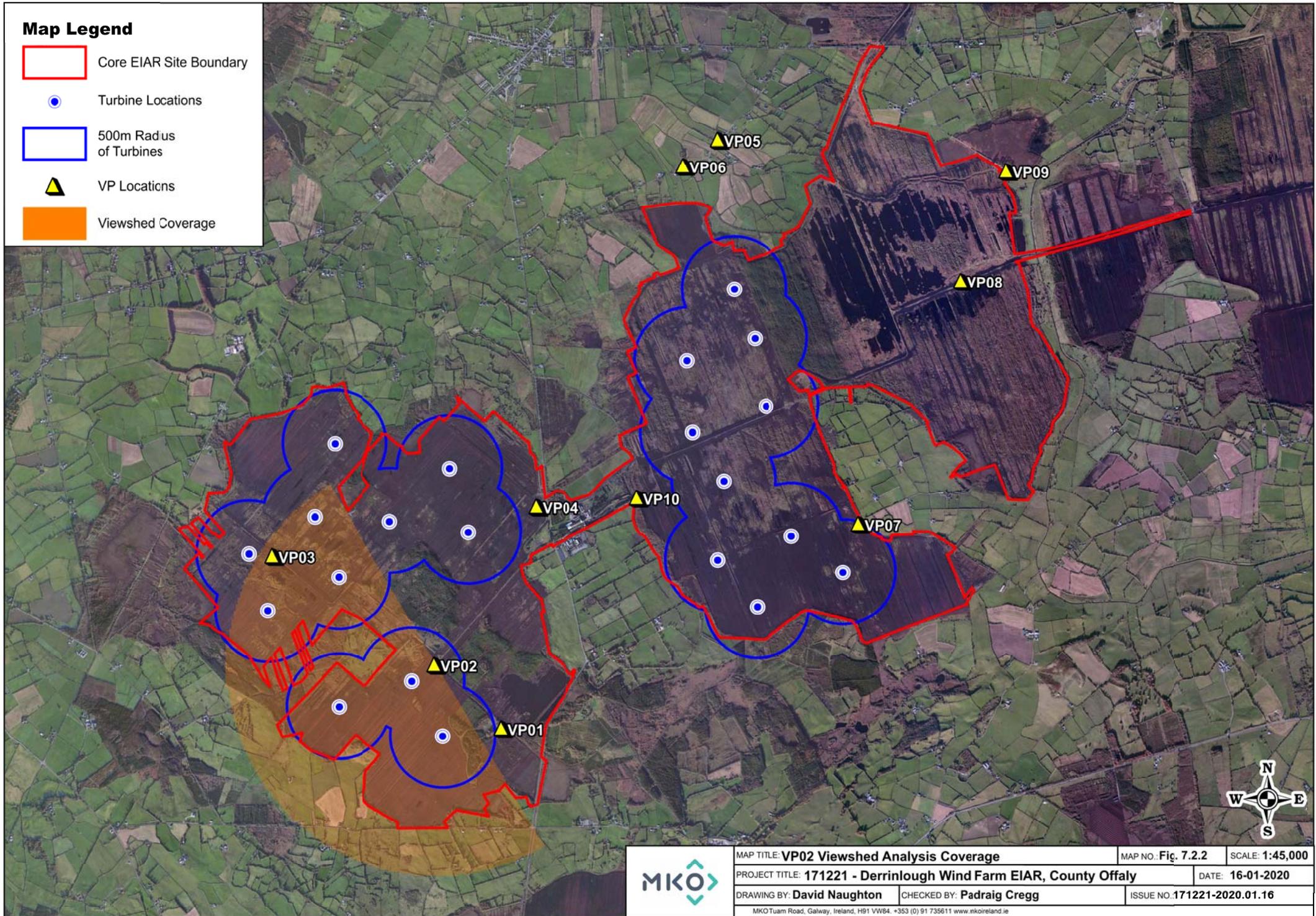
### Map Legend

-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



### Map Legend

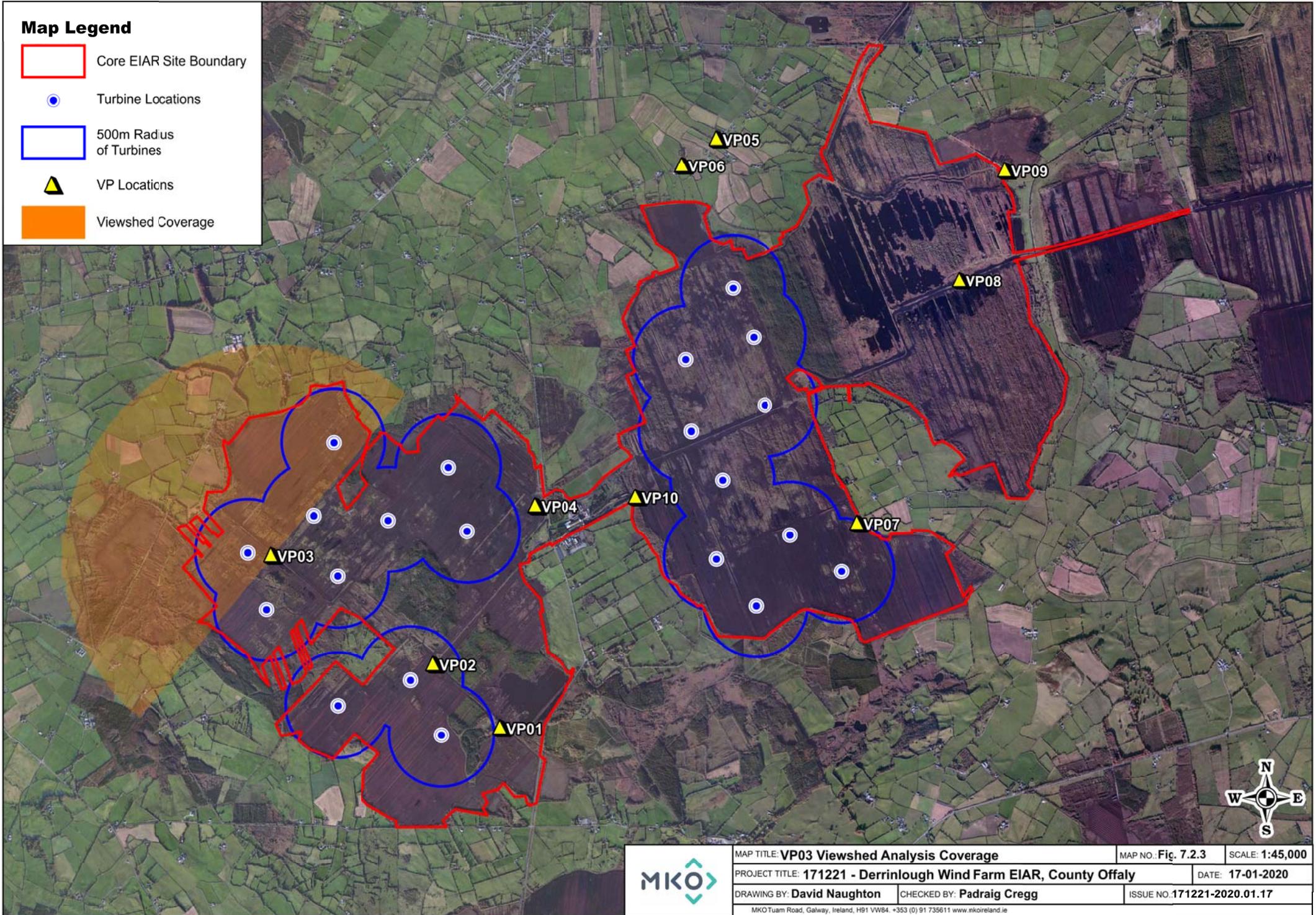
-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



|   |   |                                  |                                    |
|---|---|----------------------------------|------------------------------------|
|  | MAP TITLE: <b>VP02 Viewshed Analysis Coverage</b>   | MAP NO.: <b>Fig. 7.2.2</b>       | SCALE: <b>1:45,000</b>             |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>16-01-2020</b>          |                                    |
|   | DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO. <b>171221-2020.01.16</b> |
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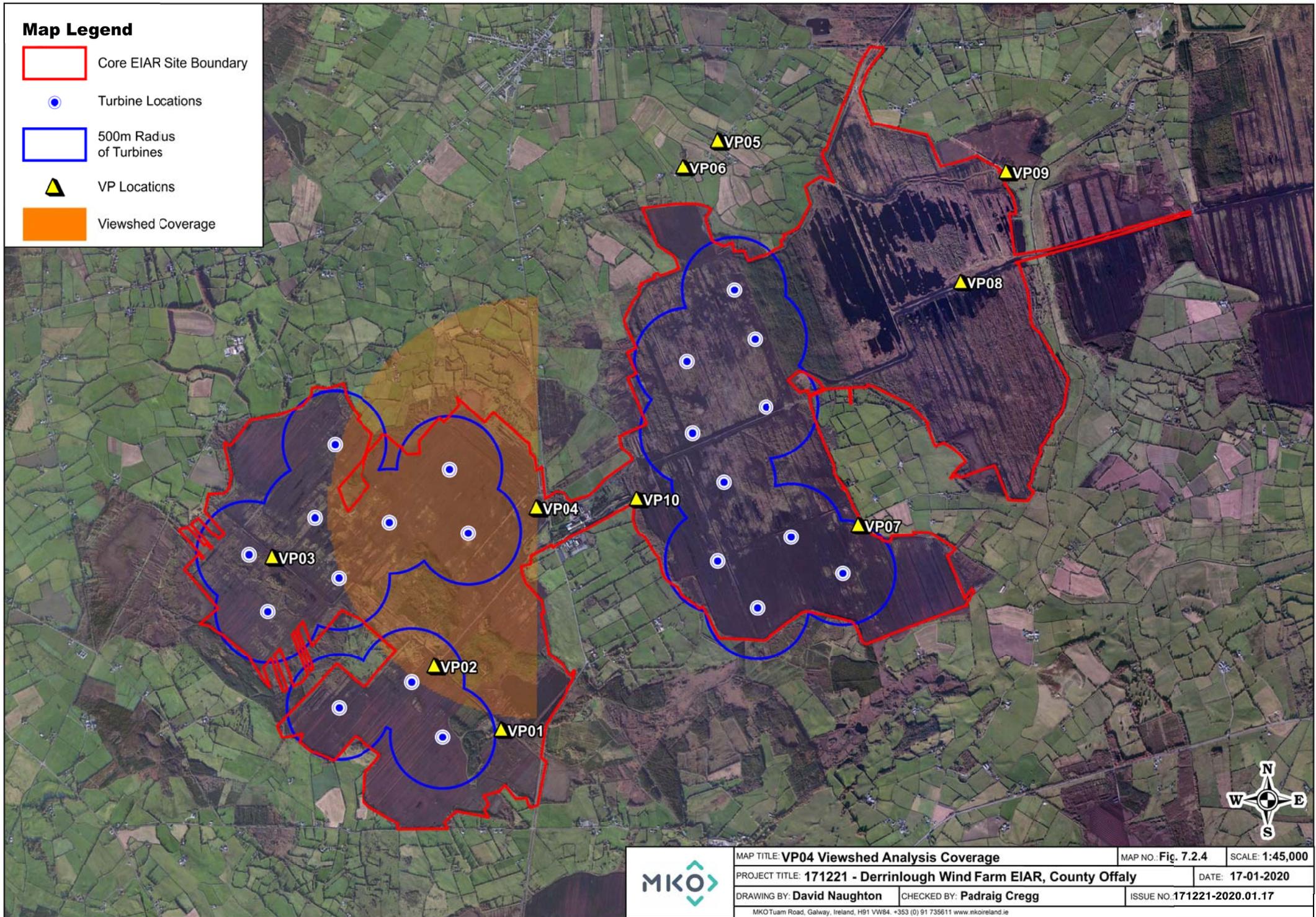
### Map Legend

-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



### Map Legend

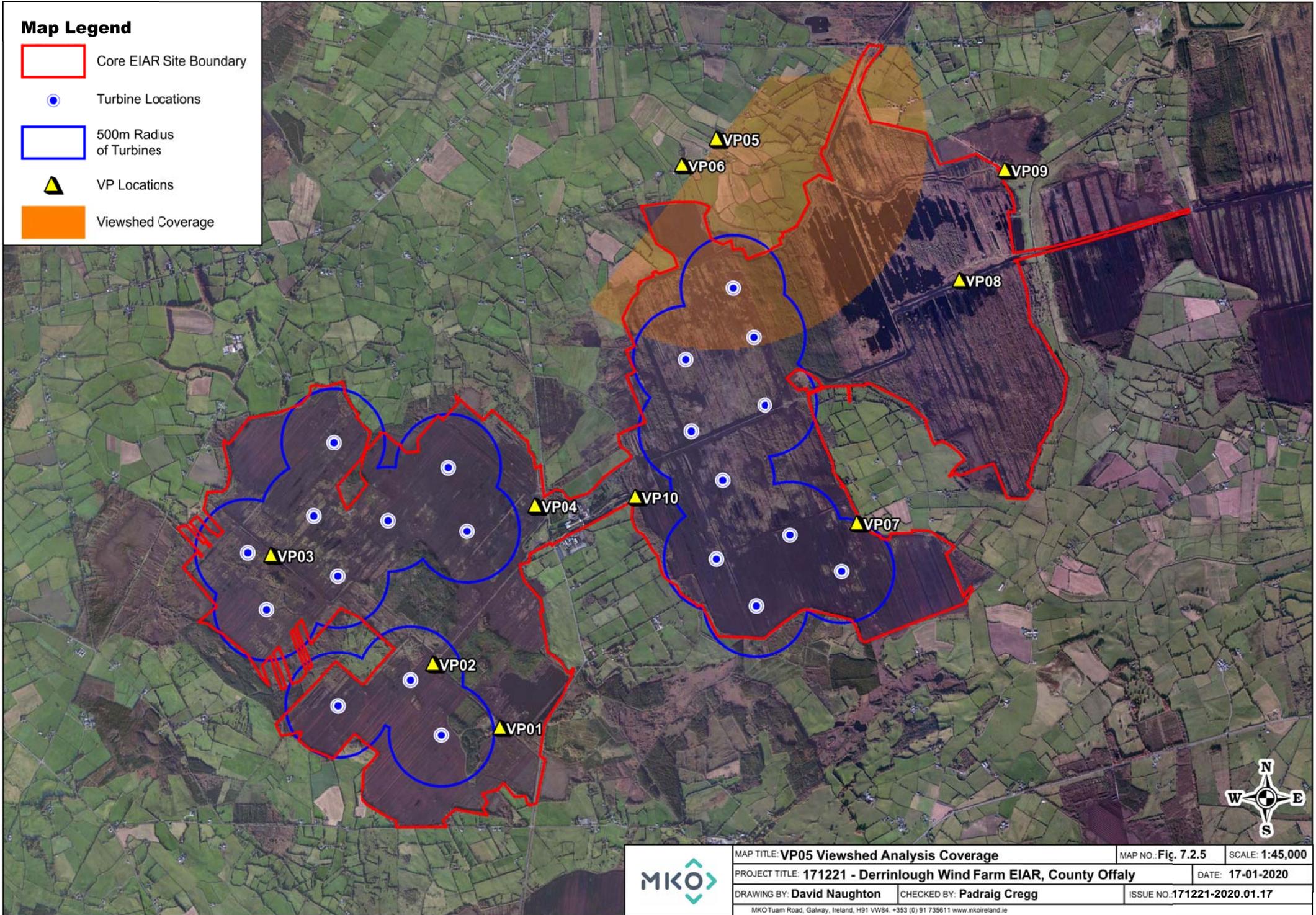
-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



|   |   |                                  |                                    |
|---|---|----------------------------------|------------------------------------|
|  | MAP TITLE: <b>VP04 Viewshed Analysis Coverage</b>   | MAP NO.: <b>Fig. 7.2.4</b>       | SCALE: <b>1:45,000</b>             |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>17-01-2020</b>          |                                    |
|   | DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO. <b>171221-2020.01.17</b> |
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### Map Legend

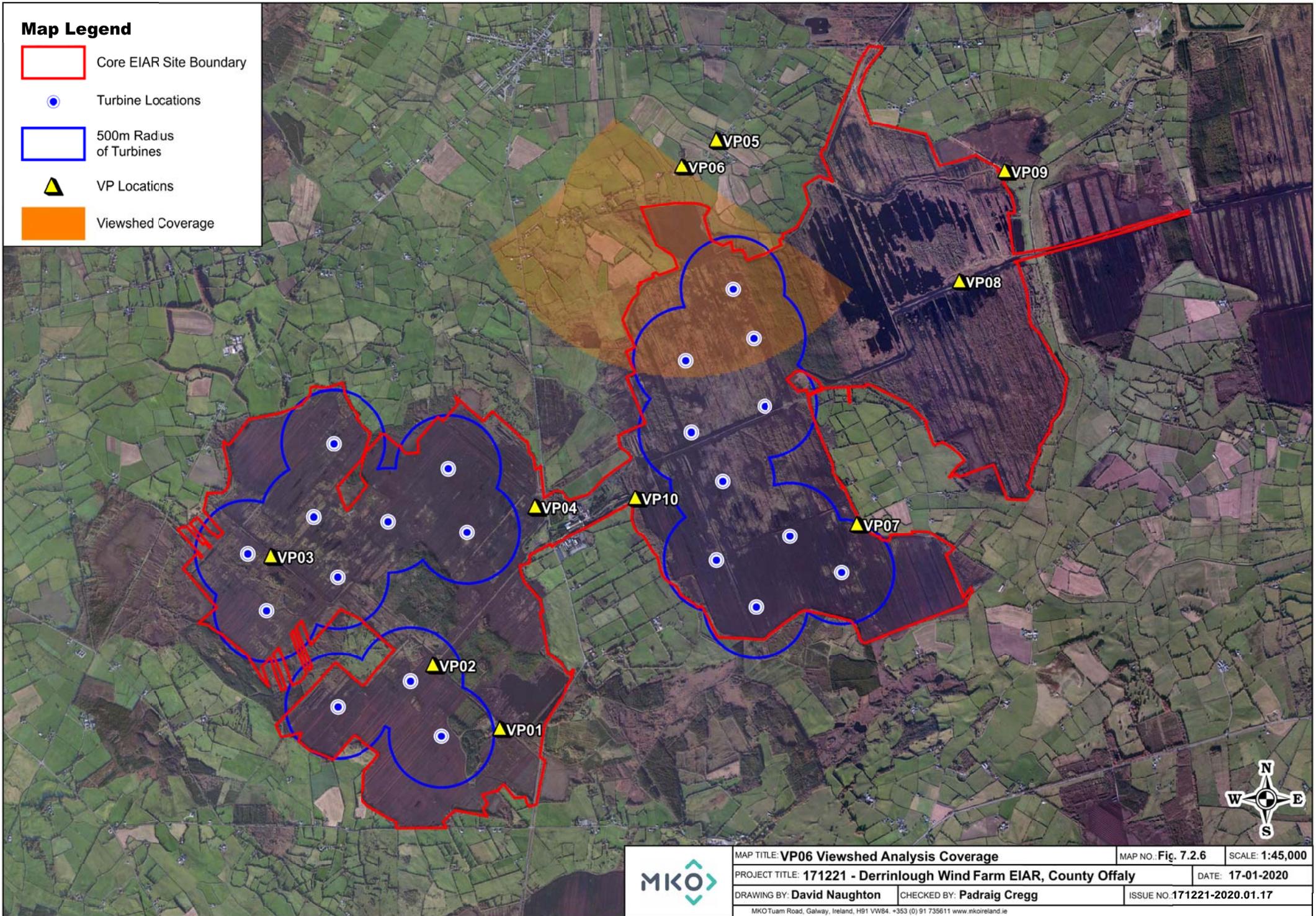
-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



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|---|----------------------------------|------------------------------------|
| MAP TITLE: <b>VP05 Viewshed Analysis Coverage</b>   | MAP NO.: <b>Fig. 7.2.5</b>       | SCALE: <b>1:45,000</b>             |
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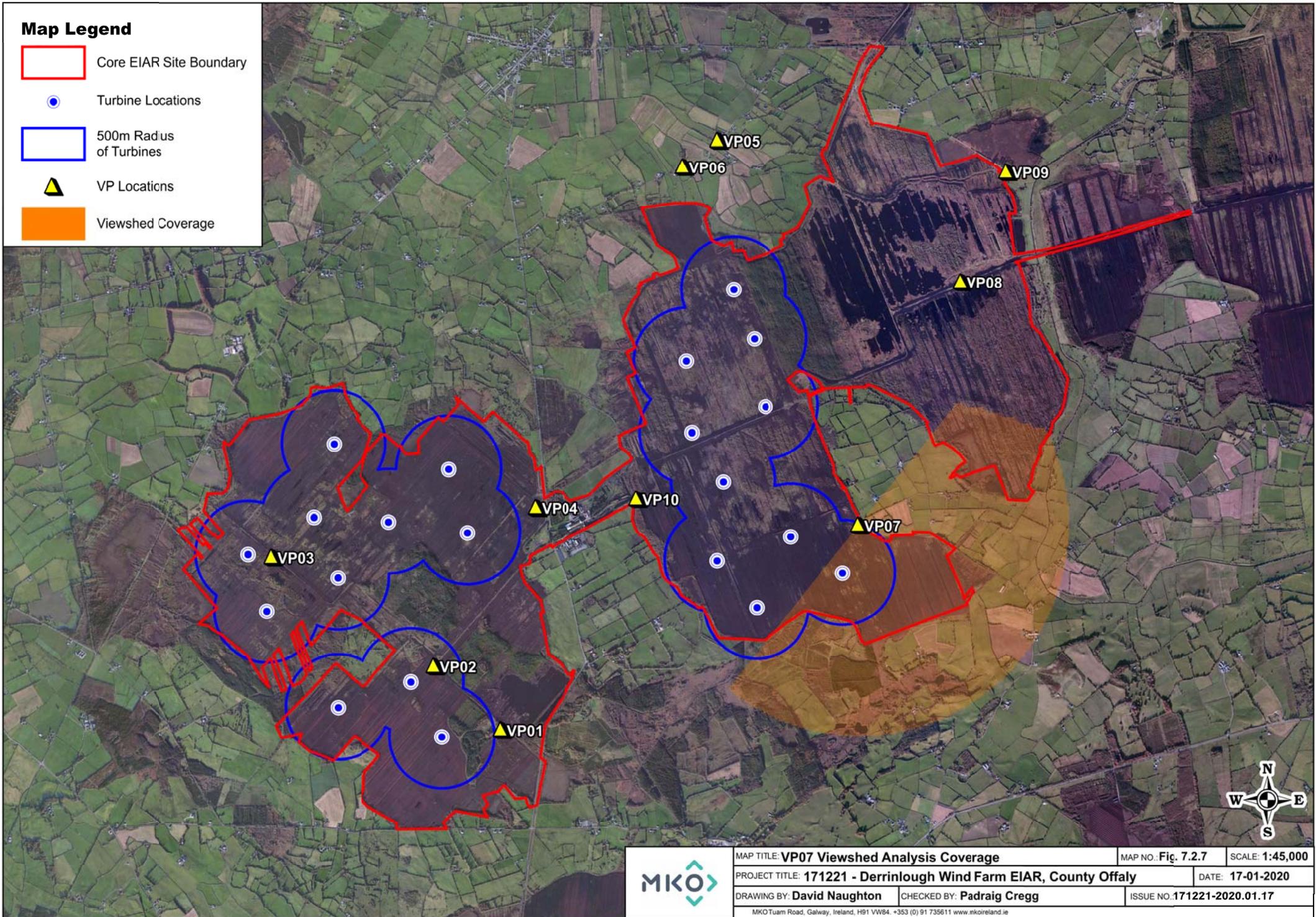
-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



|   |                                  |                                    |
|---|----------------------------------|------------------------------------|
| MAP TITLE: <b>VP06 Viewshed Analysis Coverage</b>   | MAP NO.: <b>Fig. 7.2.6</b>       | SCALE: <b>1:45,000</b>             |
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| DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO. <b>171221-2020.01.17</b> |
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### Map Legend

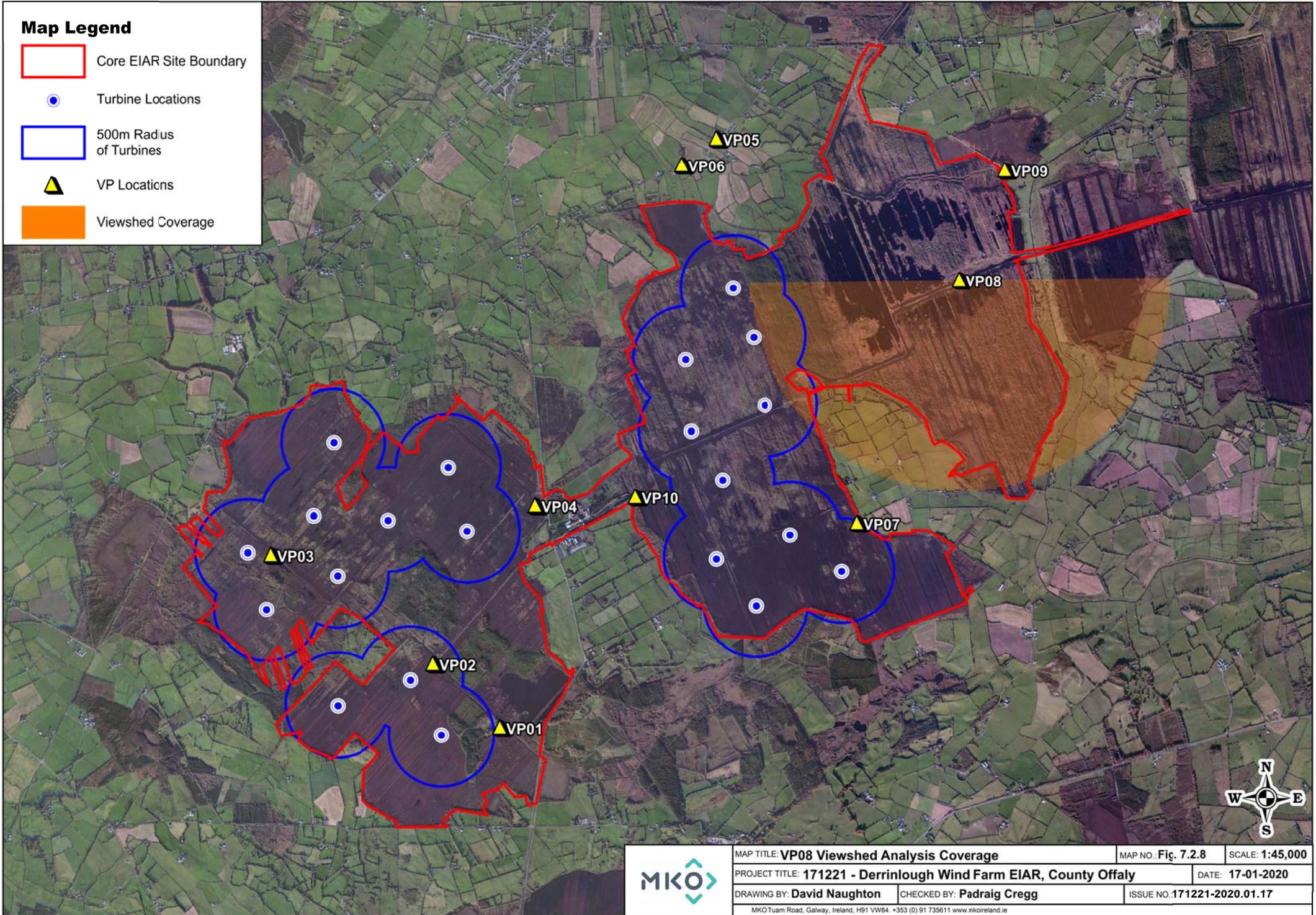
-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



|   |   |                                  |                                    |
|---|---|----------------------------------|------------------------------------|
|  | MAP TITLE: <b>VP07 Viewshed Analysis Coverage</b>   | MAP NO.: <b>Fig. 7.2.7</b>       | SCALE: <b>1:45,000</b>             |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>17-01-2020</b>          |                                    |
|   | DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO. <b>171221-2020.01.17</b> |
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### Map Legend

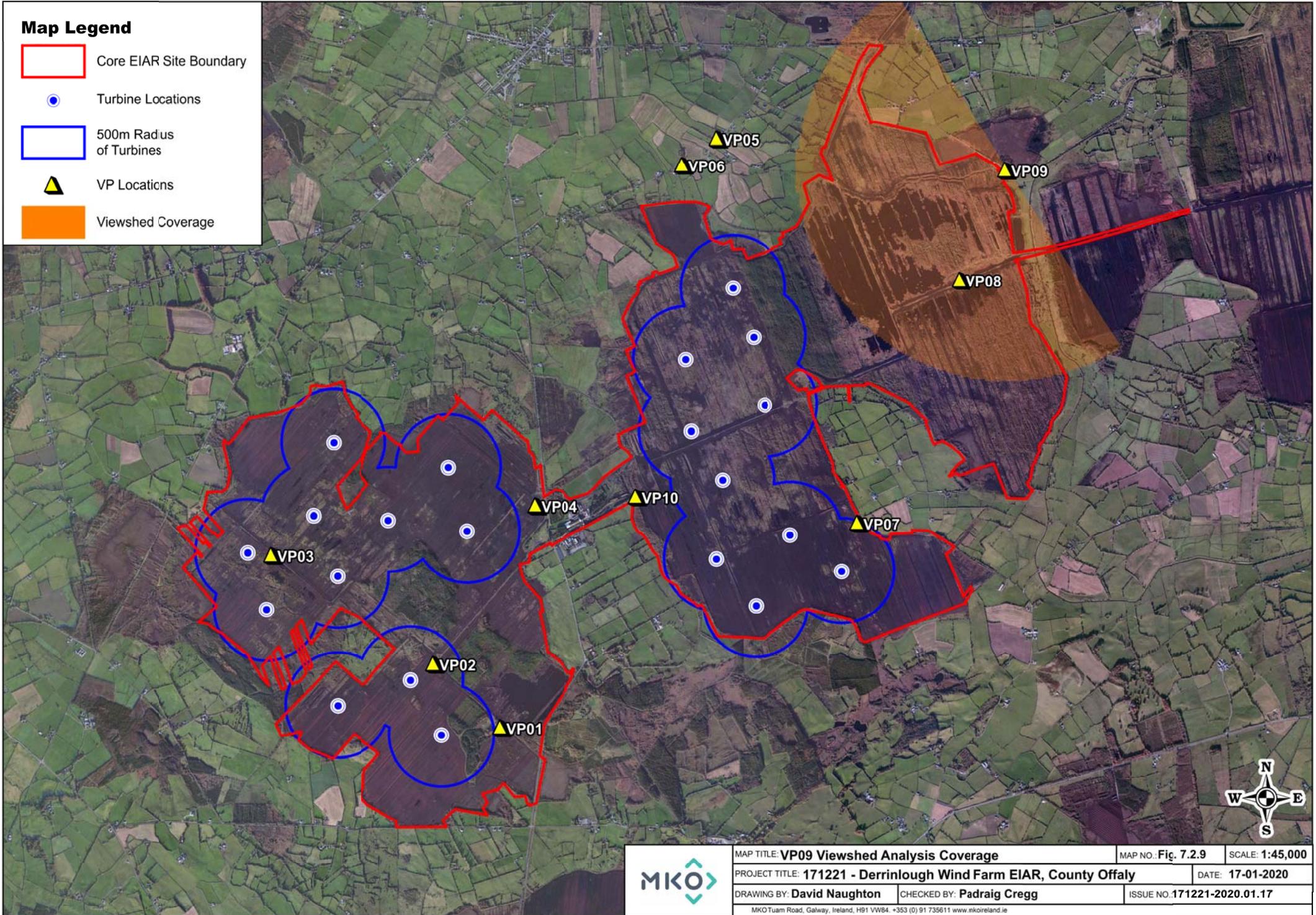
-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



|   |   |                                  |                                    |
|---|---|----------------------------------|------------------------------------|
|  | MAP TITLE: <b>VP08 Viewshed Analysis Coverage</b>   | MAP NO.: <b>Fig. 7.2.8</b>       | SCALE: <b>1:45,000</b>             |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>17-01-2020</b>          |                                    |
|   | DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO. <b>171221-2020.01.17</b> |
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### Map Legend

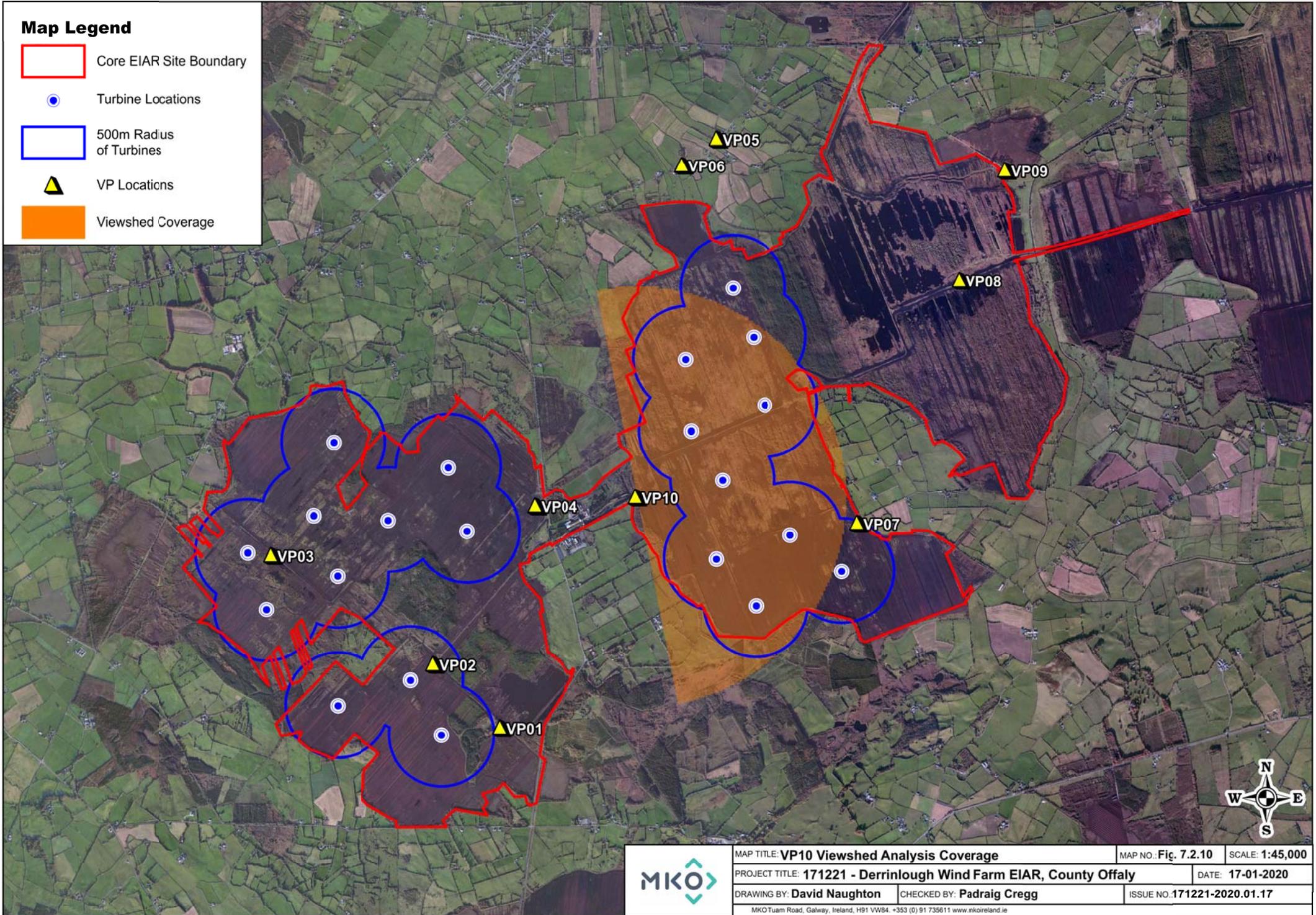
-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



|   |   |                                  |                                    |
|---|---|----------------------------------|------------------------------------|
|  | MAP TITLE: <b>VP09 Viewshed Analysis Coverage</b>   | MAP NO.: <b>Fig. 7.2.9</b>       | SCALE: <b>1:45,000</b>             |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>17-01-2020</b>          |                                    |
|   | DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO. <b>171221-2020.01.17</b> |
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### Map Legend

-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Radius of Turbines
-  VP Locations
-  Viewshed Coverage



Transect routes were devised to ensure coverage of different habitat complexes between vantage point locations within the study area. Transects were selected in order to survey every area of suitable breeding/foraging habitat to within 100m, in areas where access allowed. Where access was not possible for example on 3<sup>rd</sup> party lands, the areas were surveyed from Bord na Móna property or public roads where possible. Target species included waders, raptors, waterbirds and gulls. Along with target species, all additional species observed were recorded to inform the evaluation of supporting habitat.

Walkover surveys were carried out from dawn onward during the core breeding season months of April, May and June (2018) and April, May, June and July (2019), with the site being visited on eight days per month. The core breeding season for lowland waders is April-June, which was surveyed during both the 2018 and 2019 breeding season. In addition, breeding season surveys in 2019 included the month of July to determine success of breeding birds or any potential late breeding pairs. 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 2. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Figure 7.3 shows the area 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. 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, and other raptor species.

This included surveying suitable buildings (where access allowed) within a 1km radius (as per SNH 2017 recommendations for surveying owls) of the site for barn owl. Two buildings were identified with potential to support barn owl (>500m) to the west of the proposed development area. No evidence of occupancy was recorded.

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 2018 and 2019). 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 3. Figure 7.4 shows the areas surveyed.

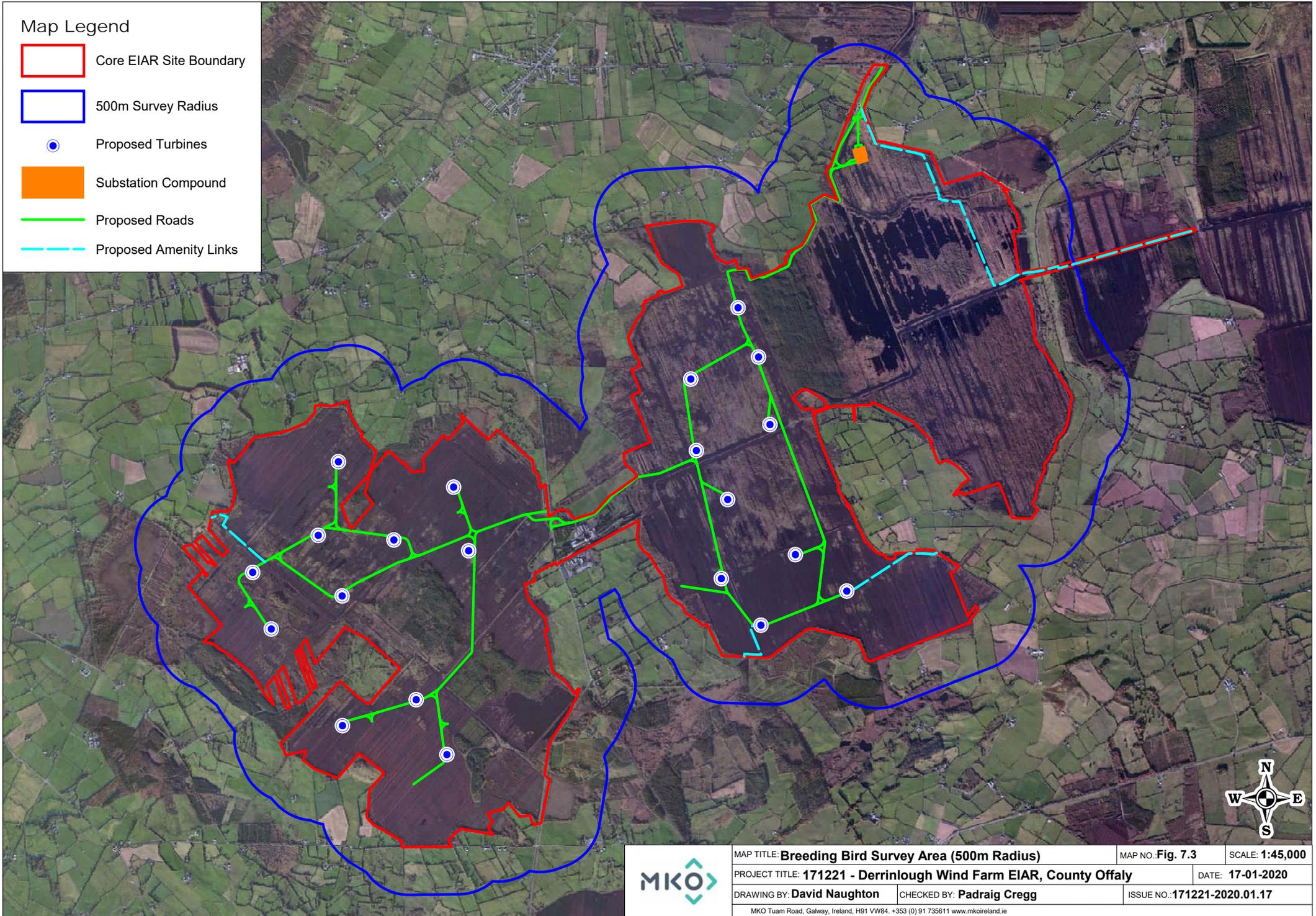
#### 7.2.4.2.4 **Breeding Woodcock Surveys**

Breeding woodcock surveys were undertaken in accordance with Gilbert et.al (1998). Two survey visits were undertaken in June 2018, surveyors were in position from an hour before sunset until last visible light. In 2019, three survey visits were undertaken between May and June to areas of suitable habitat. The survey area extended 500m beyond the site boundary and was focused in areas of suitable habitat. Surveys commenced one hour before sunset and continued for one hour after sunset or until it was too dark to see. Transects were slowly walked through areas of suitable woodland habitat onsite and to a 500m radius of the development area. All observations of woodcock (as well as the areas covered) are recorded on to a map. The aim of the survey was to record the presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the study area. This survey method also allowed the observer to survey for owls, i.e. barn owls and long-eared owls.

Survey effort is presented in Appendix 7.2, Table 4. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Figure 7.5 shows the transect routes surveyed.

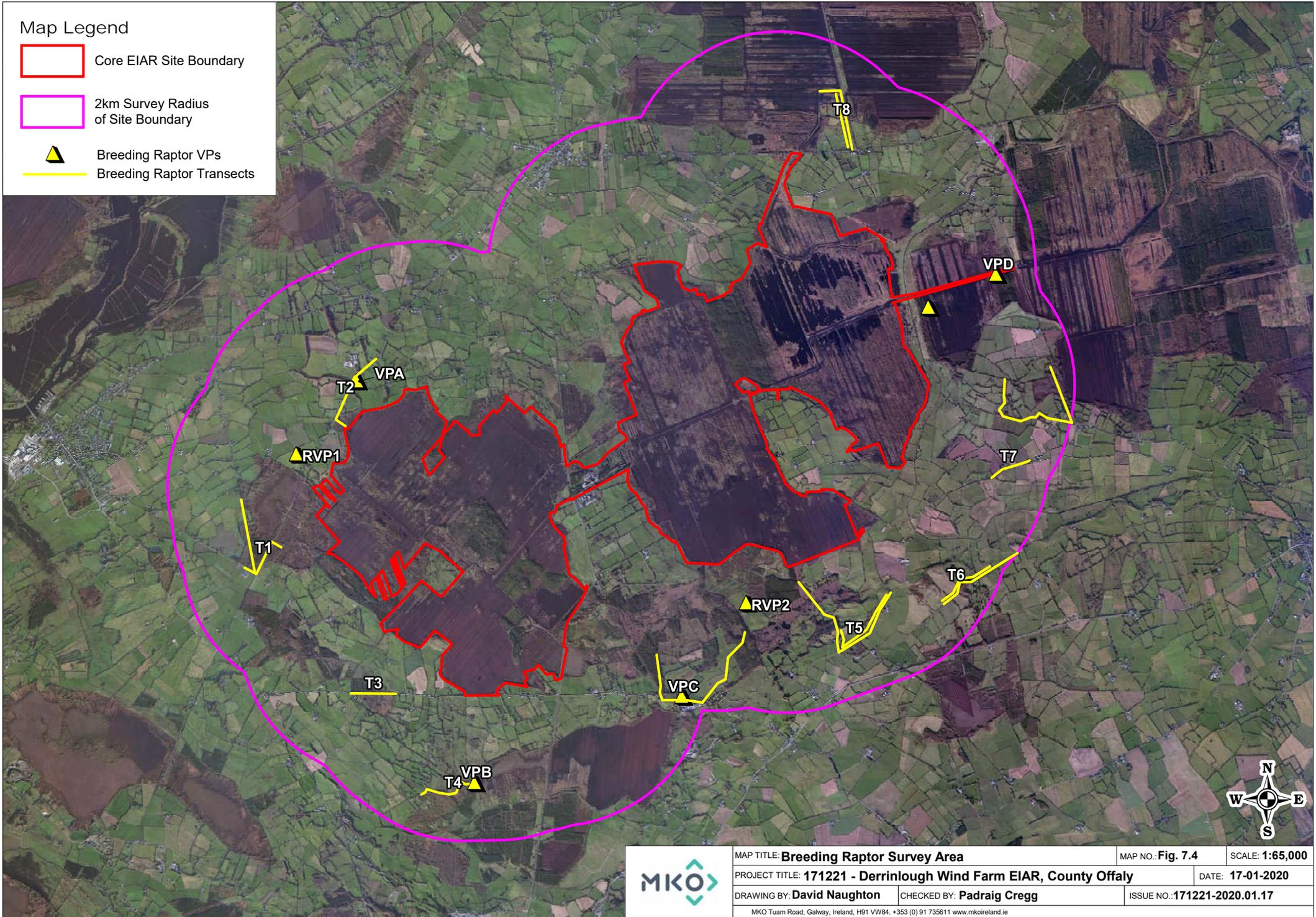
Map Legend

- Core EIAR Site Boundary
- 500m Survey Radius
- Proposed Turbines
- Substation Compound
- Proposed Roads
- Proposed Amenity Links



Map Legend

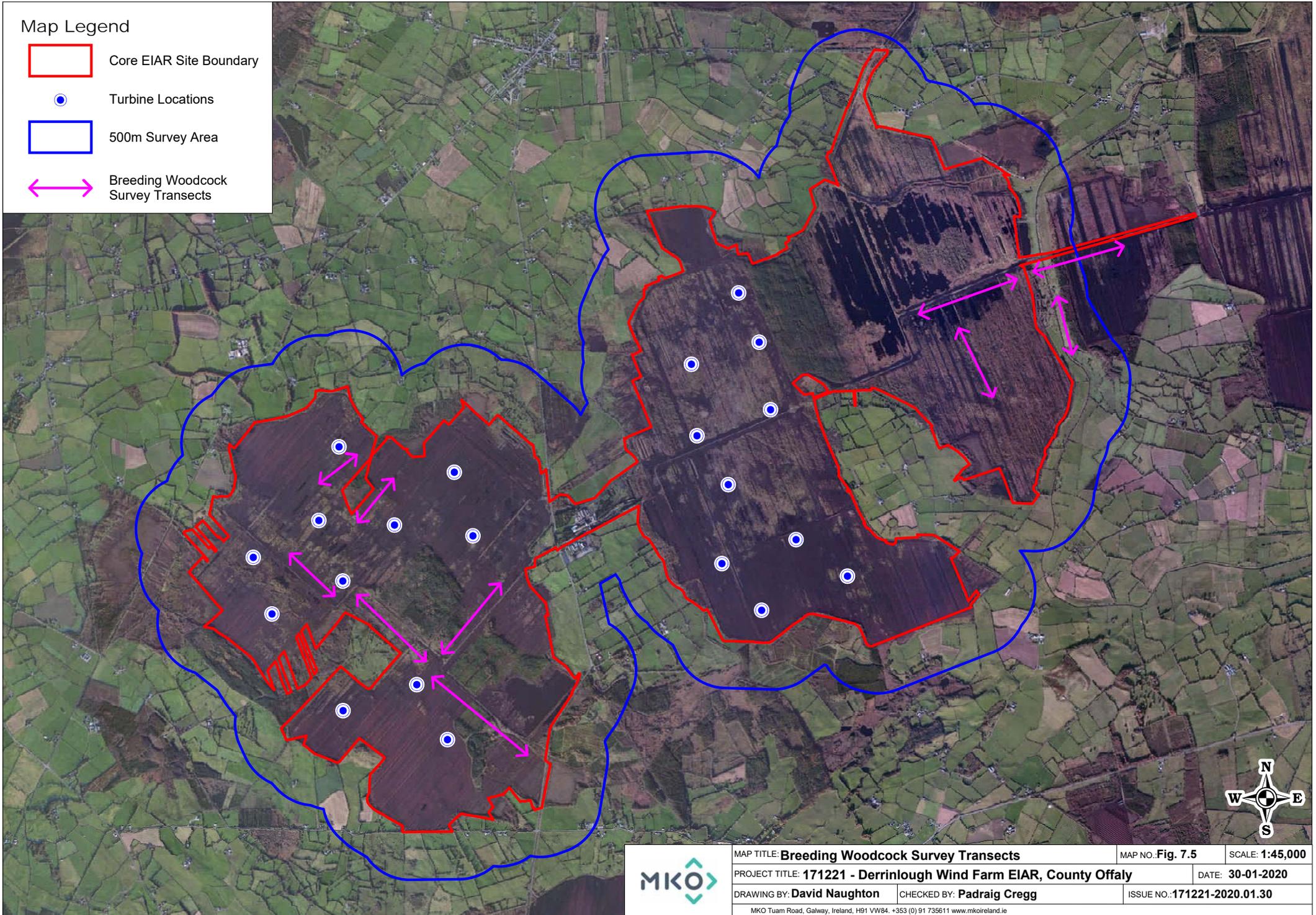
- Core EIAR Site Boundary
- 2km Survey Radius of Site Boundary
- ▲ Breeding Raptor VPs
- Breeding Raptor Transects



|   |  |                                  |                                     |  |
|---|--|----------------------------------|-------------------------------------|--|
|  | MAP TITLE: <b>Breeding Raptor Survey Area</b>                                  | MAP NO.: <b>Fig. 7.4</b>         | SCALE: <b>1:65,000</b>              |  |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>       |                                  | DATE: <b>17-01-2020</b>             |  |
|   | DRAWING BY: <b>David Naughton</b>  | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO.: <b>171221-2020.01.17</b> |  |
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Map Legend

-  Core EIAR Site Boundary
-  Turbine Locations
-  500m Survey Area
-  Breeding Woodcock Survey Transects



|   |                                  |                                     |
|---|----------------------------------|-------------------------------------|
| MAP TITLE: <b>Breeding Woodcock Survey Transects</b>  | MAP NO.: <b>Fig. 7.5</b>         | SCALE: <b>1:45,000</b>              |
| PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>30-01-2020</b>          |                                     |
| DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO.: <b>171221-2020.01.30</b> |
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#### 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 proposed development area (as per SNH 2017).

Hen Harriers may roost communally in winter, generally in rank ground vegetation (Clarke and Watson 1997). In Ireland, suitable roosting habitat is typically restricted to dense vegetation, such as heather, dense rushes (*Juncus spp.*) or young commercially planted conifers. Although this species breeds in upland areas, wintering birds disperse widely and can frequently be found in lowland areas of the midlands of Ireland.

Hen harrier roost surveys were undertaken at six fixed locations, between October 2018 and March 2019. Hen harrier roost survey methods followed those set out by Gilbert et al. (1998) and were in accordance with the NPWS National Winter Hen Harrier Roost Survey recommendations (Ruddock et al. 2016). Surveyors were in place an hour and a half before sunset and recorded all observations of hen harrier until last visible light. Information recorded by surveyors from the vantage points included; the number of hen harrier entering a roost, the time, age, and sex, where possible.

Full details of survey effort are provided in Appendix 7.2 Table 5. Figure 7.6 shows the locations of Hen Harrier Roost Survey VP locations.

#### 7.2.4.2.6 Winter Transect/Waterfowl Surveys

##### Biosphere Environmental Services (BES) Surveys

During the winter of 2017/2018 BES undertook dedicated wetland and waterfowl surveys, with a particular emphasis on whooper swan and Greenland white-fronted goose. These species were targeted based on historical use of the wider area. The survey area extended to 5km from the development boundary. The areas surveyed included Noggusboy, Derries, Derrybrat, Boora complex and Turraun bog sites as well as grasslands with foraging potential for swans and geese. These surveys were undertaken on one day per month.

Walked transects were also conducted during the months of November, January and March during the winter season (October 2017 – March 2018). Transects were selected following identifiable tracks including railways through the bog. Methodology for these surveys was broadly based on Bibby et al. (2000). The number of transects used was determined by the size of the site and diversity of habitats present. Figure 7.7a shows the transects used by BES in the 2017/2018 winter season, as well as the areas surveyed during waterfowl surveys within 5km.

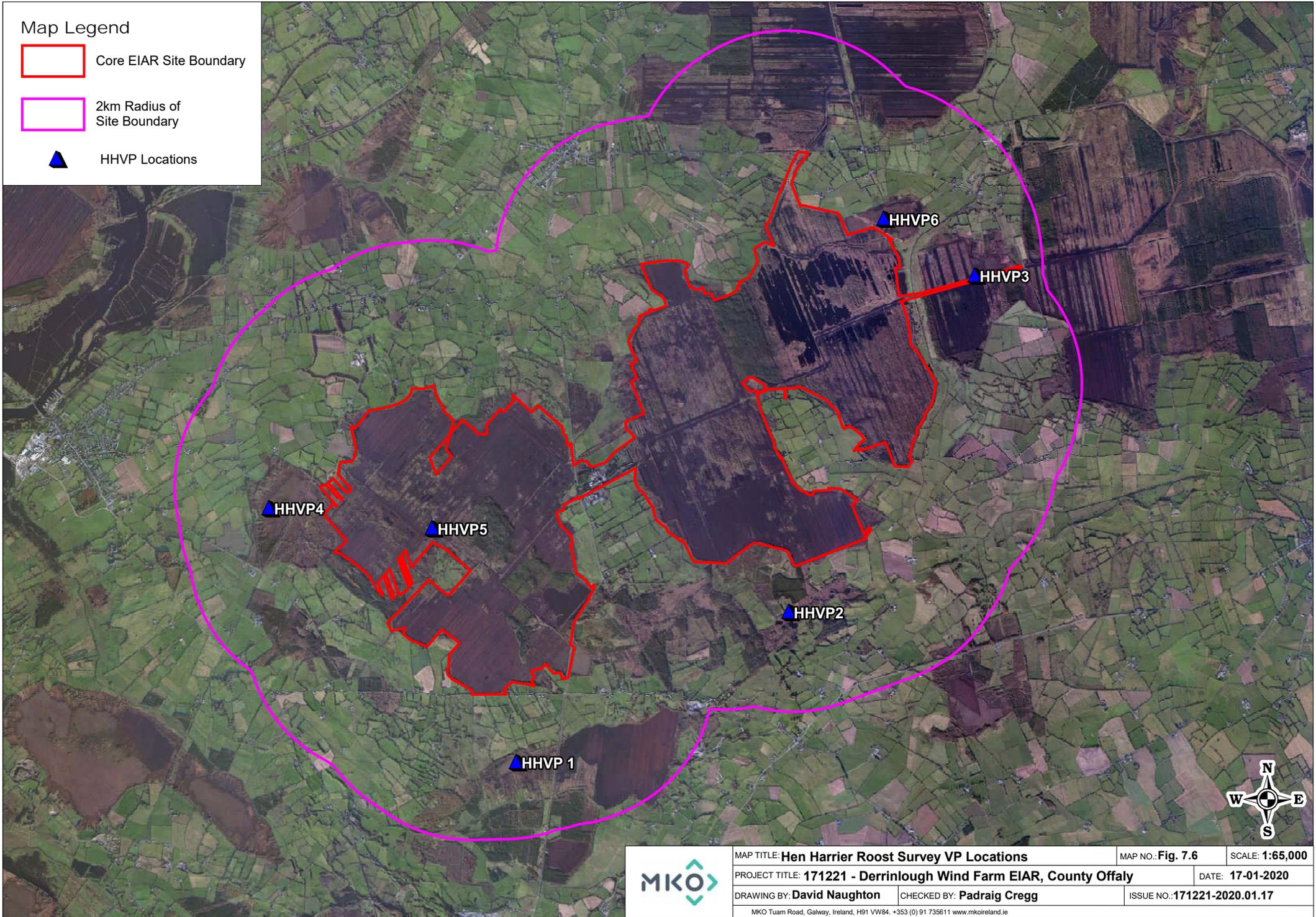
##### McCarthy Keville O'Sullivan (MKO) Surveys

Significant wetland sites within 1km of the study area were surveyed for waterbird populations (i.e. waders, waterfowl, gulls, grebes and rails) by MKO in the winter 2018/2019 season (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. In accordance with SNH (2017), counts were undertaken bimonthly, August 2018 to May 2019, 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 sites. Surveys comprised of three survey days per visit, with two visits undertaken each month between August 2018 and May 2019.

In addition, transect routes were also undertaken to ensure coverage of different habitat complexes within the development site and 500m of same during winter months. While the primary concern during these surveys was wintering waterfowl, other target species (e.g. raptors, gulls, etc.) as well as passerines were also recorded. Survey effort, including details of survey duration and weather condition, is presented in Appendix 7.2, Table 6. Figure 7.7b shows the surveyed area.

Map Legend

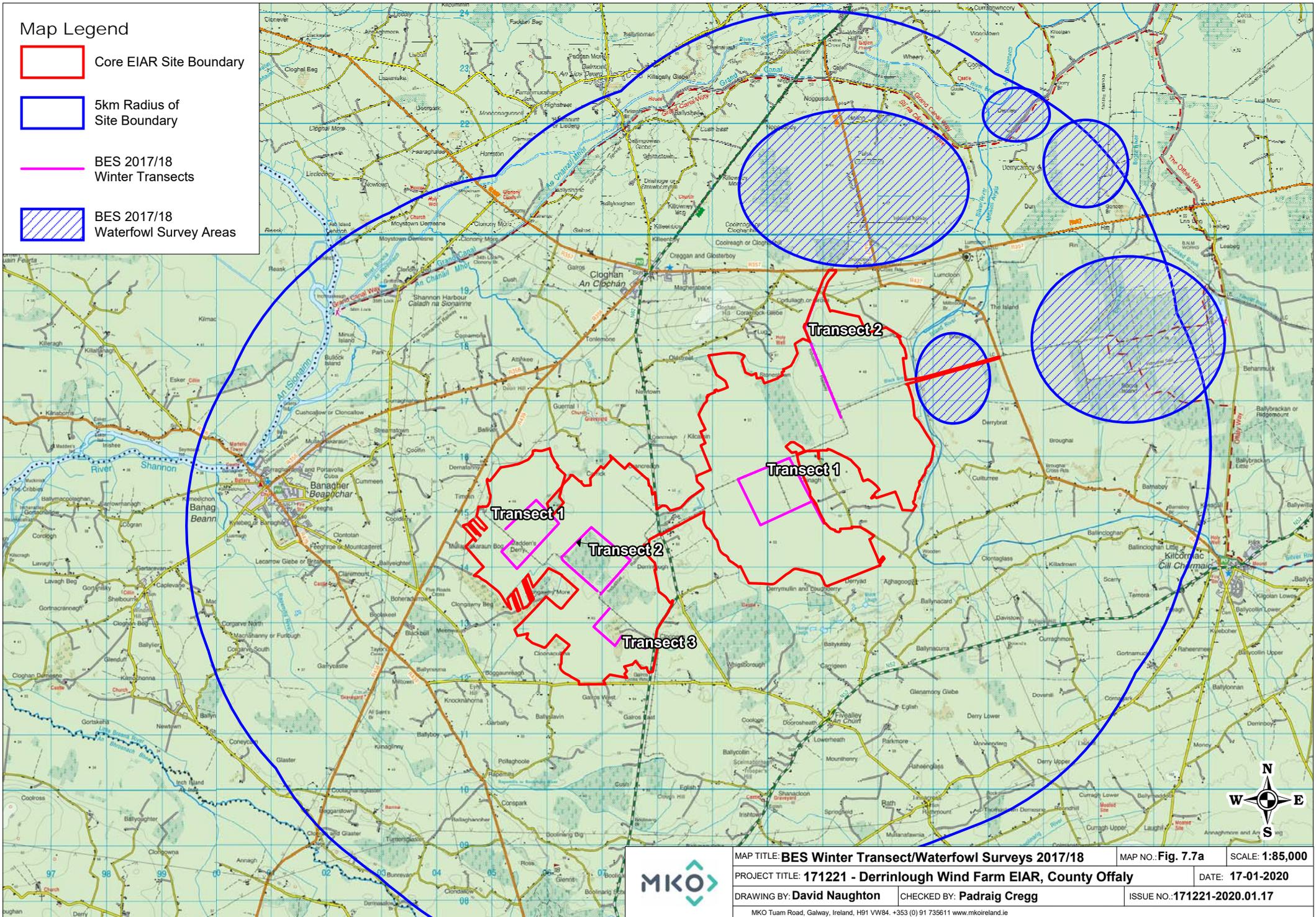
-  Core EIAR Site Boundary
-  2km Radius of Site Boundary
-  HHVP Locations



|   |   |                                  |                                     |
|---|---|----------------------------------|-------------------------------------|
|  | MAP TITLE: <b>Hen Harrier Roost Survey VP Locations</b>                                       | MAP NO.: <b>Fig. 7.6</b>         | SCALE: <b>1:65,000</b>              |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>17-01-2020</b>          |                                     |
|   | DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO.: <b>171221-2020.01.17</b> |
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Map Legend

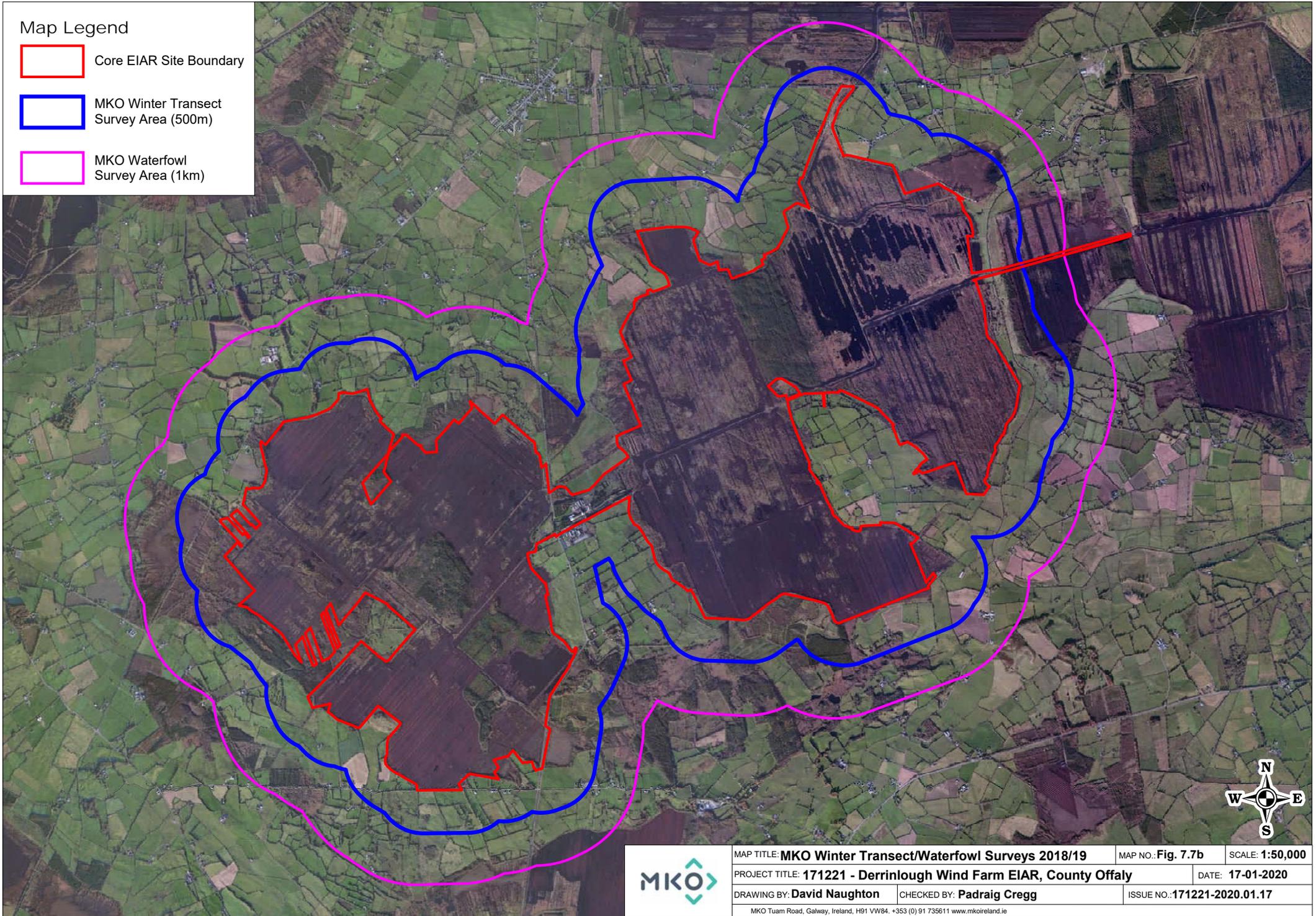
-  Core EIAR Site Boundary
-  5km Radius of Site Boundary
-  BES 2017/18 Winter Transects
-  BES 2017/18 Waterfowl Survey Areas



|  |                                  |                                     |
|--|----------------------------------|-------------------------------------|
| MAP TITLE: <b>BES Winter Transect/Waterfowl Surveys 2017/18</b>                | MAP NO: <b>Fig. 7.7a</b>         | SCALE: <b>1:85,000</b>              |
| PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>       | DATE: <b>17-01-2020</b>          |                                     |
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Map Legend

-  Core EIAR Site Boundary
-  MKO Winter Transect Survey Area (500m)
-  MKO Waterfowl Survey Area (1km)



|   |  |                                  |                                     |
|---|--|----------------------------------|-------------------------------------|
|  | MAP TITLE: <b>MKO Winter Transect/Waterfowl Surveys 2018/19</b>                | MAP NO.: <b>Fig. 7.7b</b>        | SCALE: <b>1:50,000</b>              |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>       |                                  | DATE: <b>17-01-2020</b>             |
|   | DRAWING BY: <b>David Naughton</b>  | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO.: <b>171221-2020.01.17</b> |
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#### 7.2.4.2.7 Migratory Bird Surveys

Based on the results of the desk study, consultation and reconnaissance site visits, the River Shannon and Little Brosna River were identified as potential commuting/migratory corridors for bird species, particularly swans and geese. Migratory VP watches began in September 2018 to monitor the movements of sensitive wildfowl, with an emphasis on whooper swan and Greenland white-fronted geese, in the wider surroundings of the proposed development. VPs were positioned along adjacent sections of the River Shannon and Little Brosna River within an 8km radius of the development site. Surveyors recorded the movements of swans, geese and other wildfowl within the SPAs to the west of the site and the surrounding areas. The aim was to determine if there was any connectivity between these SPAs and the proposed development site to the east, i.e. if regular commuting/migratory flights were recorded these would be considered to constitute evidence of connectivity between the SPA and the proposed development area.

Watches at the six vantage points (VPs) were undertaken from September 2018 to May 2019. Three-hour watches were undertaken at these six fixed VP locations. These surveys followed vantage point survey methods as outlined in SNH (2017). Each VP was surveyed twice per month with a minimum of a two-week gap between repeat visits. Surveys regularly alternated between dusk and dawn surveys to capture the peak activity times for migrating swans and geese or flock movements between roosting/feeding sites along the River Shannon corridor. Survey effort, including details of survey duration and weather condition, is presented in Appendix 7.2, Table 7. Figure 7.8 shows the VP locations.

#### 7.2.4.2.8 Crane Dusk Surveys

Although common crane was once a widespread and common resident bird species in Ireland, they are now extinct in this country as a breeding species with observations in recent years a rare occurrence. Common crane is now a vagrant species in Ireland, recorded predominantly during winter months. Dedicated common crane surveys were commissioned in March 2019 as this species was observed to be roosting within the development site on occasion during VP surveys between December 2018 and February 2019. Two three-hour dusk VP watches as well as one dawn watch were conducted during March 2019. Watches took place from a fixed location within the development site overlooking the area where crane had been previously recorded, to determine if the birds were still using these areas. Survey methods broadly followed SNH (2017) recommendations for flight activity surveys. Survey details are provided in Appendix 7.2, Table 8. Figure 7.9 shows the areas surveyed.

#### 7.2.4.2.9 BES Additional Survey Effort

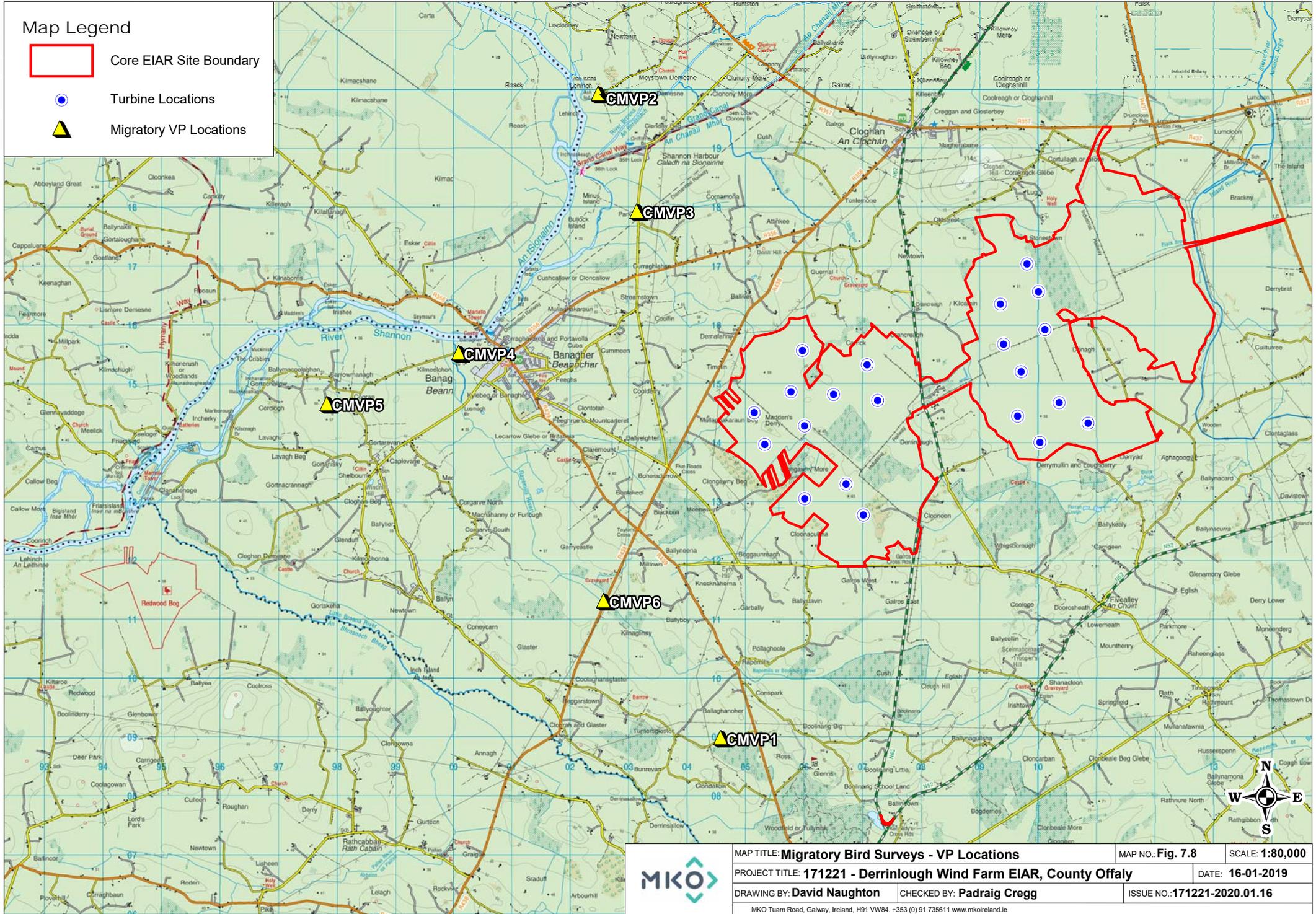
Survey data gathered during the period October 2017 - September 2019 forms the core dataset for the assessment of effects on ornithology. The various survey methodologies used during this survey period have been described above. The core dataset has been supplemented with additional data from BES surveys between October 2014 and September 2017.

During the period 2014 – 2017 BES undertook Vantage Point surveys at Derrinlough from fixed survey locations as well as undertaking walked transects during both breeding and non-breeding seasons. Vantage point surveys initially took place from seven fixed VPs, which included the same four VPs which were used between October 2017 and September 2019 on the Clongawny side of the site (VP1 – VP4). An additional eight VP was added in April 2016, to provide additional coverage of the Drinagh wetlands in the east of the site. Each VP had a minimum of 36-hours per survey season in compliance with SNH guidance (SNH 2017).

While it was acknowledged that the Drinagh wetlands was to be avoided/constrained out of the development/planning processes, the importance of these areas for birds led to the introduction of an additional two VPs on the Drinagh development site in October 2017. These ten VPs were continuously surveyed for the core two-year period (October 2017 – September 2019).

Map Legend

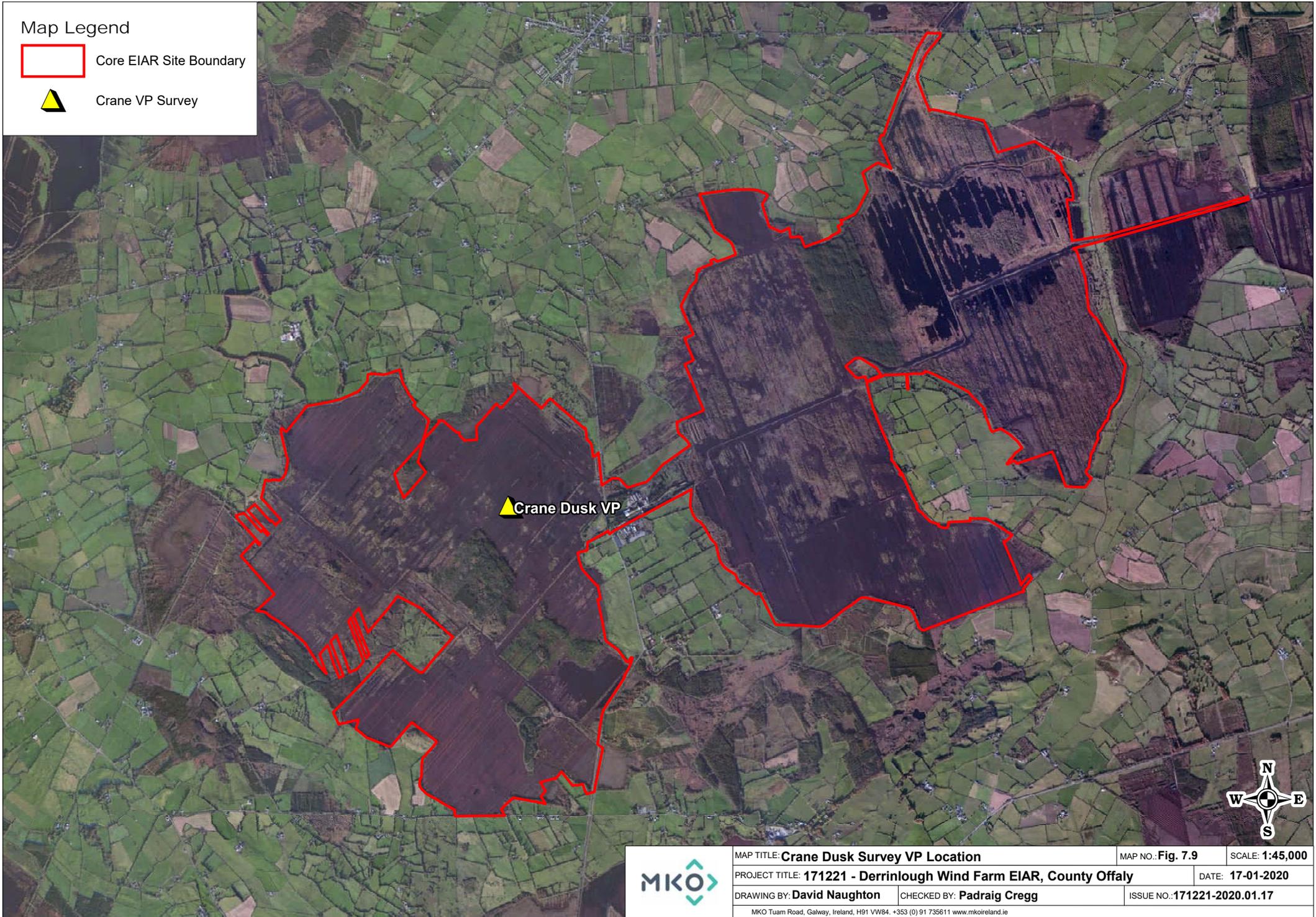
- Core EIAR Site Boundary
- Turbine Locations
- ▲ Migratory VP Locations



|   |  |                                  |                                     |  |
|---|--|----------------------------------|-------------------------------------|--|
|  | MAP TITLE: <b>Migratory Bird Surveys - VP Locations</b>                        | MAP NO: <b>Fig. 7.8</b>          | SCALE: <b>1:80,000</b>              |  |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>       |                                  | DATE: <b>16-01-2019</b>             |  |
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Map Legend

-  Core EIAR Site Boundary
-  Crane VP Survey



|   |   |                                  |                                     |
|---|---|----------------------------------|-------------------------------------|
|  | MAP TITLE: <b>Crane Dusk Survey VP Location</b>   | MAP NO.: <b>Fig. 7.9</b>         | SCALE: <b>1:45,000</b>              |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>17-01-2020</b>          |                                     |
|   | DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO.: <b>171221-2020.01.17</b> |
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## 7.2.5 Ornithological Evaluation Criteria and Impact Assessment Methodology

### 7.2.5.1 Potential Effects Associated with Proposed Development

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

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

For each of these three risks, the detailed knowledge of bird distribution and flight activity within and surrounding the site (which has been obtained through the studies outlined in section 7.1) has been utilised to predict the potential significant effects of the Proposed 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.

### 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        | <p>Species that contribute to the integrity of an SPA but which are not cited as a species for which the site is designated.</p> <p>Ecologically sensitive species including the following: divers, common scoter, hen harrier, golden eagle, red necked phalarope, roseate tern and chough.</p> <p>Species present in nationally important numbers (&gt;1% Irish population)</p> |
| Medium      | <p>Species on Annex 1 of the EU Birds Directive.</p> <p>Species present in regionally important numbers (&gt;1% regional (county) population).</p> <p>Other species on BirdWatch Ireland’s red list of Birds of Conservation Concern</p>  |
| Low         | <p>Any other species of conservation interest, including species on BirdWatch Ireland’s amber list of Birds of Conservation Concern not covered above.</p>  |

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

| Sensitivity | Description  |
|-------------|--|
| Very High   | <p>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.</p> <p>Guide: &lt; 20% of population / habitat remains</p> |
| High        | <p>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.</p> <p>Guide: 20-80% of population/ habitat lost</p>                                       |
| Medium      | <p>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.</p> <p>Guide: 5-20% of population/ habitat lost</p>   |
| Low         | <p>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.</p> <p>Guide: 1-5% of population/ habitat lost</p>    |
| Negligible  | <p>Very slight change from baseline condition. Change barely distinguishable, approximating to the “no change” situation.</p> <p>Guide: &lt; 1% population/ habitat lost</p>   |

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) |

### 7.2.5.5 Collision Risk Assessment

Collision risk is calculated using a mathematical model to predict the numbers of individual birds, of a particular species, that may be killed by collision with moving wind turbine rotor blades. The modelling method used in this collision risk calculation follows Scottish Natural Heritage (SNH) guidance which is sometimes referred to as the Band Model (Band et al. (2007).

Two stages are involved in the model:

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

Please see Appendix 7.6 for full details on the collision risk modelling method.

### 7.2.6 Survey Justification

A comprehensive suite of bird surveys has been undertaken at the Proposed Development site between October 2017 and September 2019. This data is supplemented by additional data from surveys undertaken on the site by BES between October 2014 and September 2017. These surveys recorded a similar species assemblage and similar activity levels.

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

The proposed development footprint, including the cable route and substation, is located entirely within the proposed development site. The proposed development was subject to a various suite of comprehensive survey methods during both the breeding and winter seasons.

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

#### 7.2.6.1 Mitigation

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

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

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

### 7.2.6.2 Limitations

The information provided in this EIAR chapter accurately and comprehensively describes the baseline environment; provides an accurate prediction of the likely effects of the Proposed Development; prescribes mitigation as necessary; and describes the predicted residual impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines. No significant limitations in the scope, scale or context of the assessment have been identified.

## 7.3 Baseline Conditions and Receptor Evaluation

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

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

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are designated under the EU Habitats Directive and EU Birds Directive, respectively and are collectively known as ‘European Sites’. The potential for significant effects and/or adverse impacts on the integrity of European Sites is fully assessed in the AA Screening Report and Natura Impact Statement that accompanies this application. As per EPA draft Guidance 2017, “a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement” but should “incorporate their key findings as available and appropriate”.

A list of the SPAs within the potential zone of influence of the development site and the associated Species of Conservation Interest (SCI) and Conservation Objectives are provided in Table 7.8 below. Potential significant effects and / or adverse impacts on Special Protection Areas are assessed in detail in the Appropriate Assessment and Natura Impact Statement provided in support of this application.

The following methodology was used to establish sites that are designated for nature conservation and have the potential to be impacted by the proposed development:

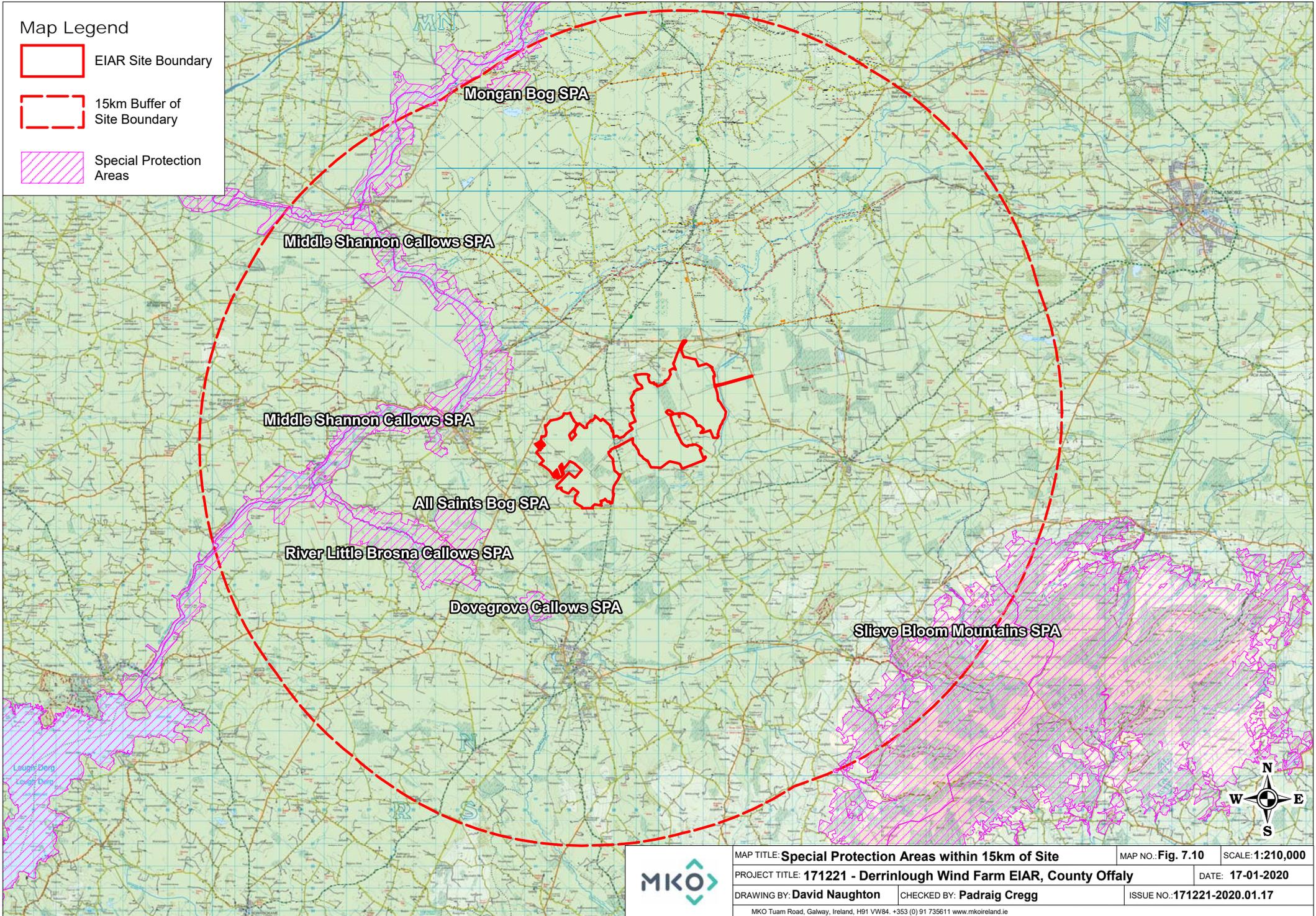
- Initially the most up to date GIS spatial datasets for European and Nationally designated sites and water catchments were downloaded from the NPWS website ([www.npws.ie](http://www.npws.ie)) and the EPA website ([www.epa.ie](http://www.epa.ie)) on the 06/12/2019. The datasets were utilised to identify Designated Sites which could feasibly be affected by the proposed development.
- All designated sites within a distance of 15km surrounding the development site were identified. In addition, the potential for connectivity with European or Nationally designated sites at distances of greater than 15km from the proposed development was also considered in this initial assessment.
- Table 7.8 provides details of all relevant SPAs identified in the preceding steps and assesses which are within the likely Zone of Impact. All European Designated Sites are fully described and assessed in the Screening for Appropriate Assessment and Natura Impact Statement reports submitted as part of this planning application.

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

SPAs located within the Likely Zone of Influence of the development are listed below in Table 7-8 and illustrated on Figure 7.10.

Map Legend

-  EIAR Site Boundary
-  15km Buffer of Site Boundary
-  Special Protection Areas



|   |                                  |                                     |
|---|----------------------------------|-------------------------------------|
| MAP TITLE: <b>Special Protection Areas within 15km of Site</b>                                | MAP NO.: <b>Fig. 7.10</b>        | SCALE: <b>1:210,000</b>             |
| PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>17-01-2020</b>          |                                     |
| DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO.: <b>171221-2020.01.17</b> |
| <small>MKO Tuam Road, Galway, Ireland, H91 VW84. +353 (0) 91 735611 www.mkoireland.ie</small> |                                  |                                     |



Table 7-8 Designated Sites in the Zone of Influence

| Special Protection Areas and distance from proposed development                                | Qualifying Interests/Special Conservation Interests for which the European Site has been designated ( <a href="https://www.npws.ie">https://www.npws.ie</a> , 21/02/2018)   | Conservation Objectives   |
|--|---|---|
| <p>Middle Shannon Callows SPA (004096)</p> <p>2.33 km to the west of the development site.</p> | <ul style="list-style-type: none"> <li>➤ Whooper Swan (<i>Cygnus Cygnus</i>) [A038]</li> <li>➤ Wigeon (<i>Anas penelope</i>) [A050]</li> <li>➤ Corncrake (<i>Crex crex</i>) [A122]</li> <li>➤ Golden Plover (<i>Pluvialis apricaria</i>) [A140]</li> <li>➤ Lapwing (<i>Vanellus vanellus</i>) [A142]</li> <li>➤ Black-tailed Godwit (<i>Limosa Limosa</i>) [A156]</li> <li>➤ Black-headed Gull (<i>Larus ridibundus</i>) [A179]</li> <li>➤ Wetland and Waterbirds [A999]</li> </ul> | <p>This site has the generic conservation objective:</p> <p>“To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.”</p> <p>This site also has a second conservation objective:</p> <p>“To maintain or restore the favourable conservation condition of the wetland habitat at Middle Shannon Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.” (NPWS (2018) Conservations objectives for Middle Shannon Callow SPA [004096]. Generic version 6.0)</p> |
| <p>All Saints Bog SPA (004103)</p> <p>2.69 km southwest of the development site.</p>           | <ul style="list-style-type: none"> <li>➤ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]</li> </ul>  | <p>This site has the generic conservation objective:</p> <p>“To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.”</p> <p>(NPWS (2018) Conservations objectives for All Saints Bog SPA [004103]. Generic version 6.0)</p>   |
| <p>Dovegrove Callows SPA (004137)</p> <p>4.21 km to the south of the development site.</p>     | <ul style="list-style-type: none"> <li>➤ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]</li> </ul>  | <p>This site has the generic conservation objective:</p> <p>“To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.”</p> <p>(NPWS (2018) Conservations objectives for Dovegrove Callows SPA [004137]. Generic version 6.0)</p>  |

| Special Protection Areas and distance from proposed development  | Qualifying Interests/Special Conservation Interests for which the European Site has been designated ( <a href="https://www.npws.ie">https://www.npws.ie</a> , 21/02/2018)   | Conservation Objectives  |
|--|---|--|
| <p>River Little Brosna Callows SPA (004086)</p> <p>4.48 km to the southwest of the development site.</p> | <ul style="list-style-type: none"> <li>➤ Whooper Swan (<i>Cygnus Cygnus</i>) [A038]</li> <li>➤ Wigeon (<i>Anas penelope</i>) [A050]</li> <li>➤ Teal (<i>Anas creca</i>) [A052]</li> <li>➤ Pintail (<i>Anas acuta</i>) [A054]</li> <li>➤ Shoveler (<i>Anas clypeata</i>) [A056]</li> <li>➤ Golden Plover (<i>Pluvialis apricaria</i>) [A140]</li> <li>➤ Lapwing (<i>Vanellus vanellus</i>) [A142]</li> <li>➤ Black-tailed Godwit (<i>Limosa Limosa</i>) [A156]</li> <li>➤ Black-headed Gull (<i>Larus ridibundus</i>) [A179]</li> <li>➤ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]</li> <li>➤ Wetland and Waterbirds [A999]</li> </ul> | <p>This site has the generic conservation objective:</p> <p>“To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.”</p> <p>This site also has a second conservation objective:</p> <p>“To maintain or restore the favourable conservation condition of the wetland habitat at River Little Brosna Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.” (NPWS (2018) Conservations objectives for Middle Shannon Callow SPA [004086]. Generic version 6.0)</p> |
| <p>Slieve Bloom Mountains SPA (004160)</p> <p>11.64 km to the southeast of the development site.</p>     | <ul style="list-style-type: none"> <li>➤ Hen Harrier (<i>Circus cyaneus</i>) [A082]</li> </ul>  | <p>This site has the generic conservation objective:</p> <p>“To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.”</p> <p>(NPWS (2018) Conservations objectives for Slieve Bloom Mountains SPA [004160]. Generic version 6.0)</p>  |
| <p>River Suck Callows SPA (004097)</p> <p>12.30 km northwest of the development site.</p>                | <ul style="list-style-type: none"> <li>➤ Whooper Swan (<i>Cygnus Cygnus</i>) [A038]</li> <li>➤ Wigeon (<i>Anas penelope</i>) [A050]</li> <li>➤ Golden Plover (<i>Pluvialis apricaria</i>) [A140]</li> <li>➤ Lapwing (<i>Vanellus vanellus</i>) [A142]</li> <li>➤ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]</li> <li>➤ Wetland and Waterbirds [A999]</li> </ul>   | <p>This site has the generic conservation objective:</p> <p>“To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.”</p> <p>This site also has a second conservation objective:</p> <p>“To maintain or restore the favourable conservation condition of the wetland habitat at River Suck Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise</p>  |

| Special Protection Areas and distance from proposed development | Qualifying Interests/Special Conservation Interests for which the European Site has been designated ( <a href="https://www.npws.ie">https://www.npws.ie</a> , 21/02/2018)   | Conservation Objectives   |
|---|---|---|
|   |   | it.” (NPWS (2018) Conservations objectives for River Suck Callow SPA [004097]. Generic version 6.0)   |
| Mongan Bog SPA<br>13.3km  | <ul style="list-style-type: none"> <li>➤ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]</li> </ul>  | <p>This site has the generic conservation objective:</p> <p><i>‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA,’</i> (NPWS, version 6, 2018).</p>   |
| Lough Derg (Shannon) SPA<br>19km                                | <ul style="list-style-type: none"> <li>➤ Cormorant (<i>Phalacrocorax carbo</i>) [A017]</li> <li>➤ Tufted Duck (<i>Aythya fuligula</i>) [A061]</li> <li>➤ Goldeneye (<i>Bucephala clangula</i>) [A067]</li> <li>➤ Common Tern (<i>Sterna hirundo</i>) [A193]</li> <li>➤ Wetland and Waterbirds [A999]</li> </ul> | <p>This site has the generic conservation objective:</p> <p><i>To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.’</i> (NPWS Generic version 6.0, 2018)</p> <p>There is a second conservation objective for this site:</p> <p><i>To maintain or restore the favourable conservation condition of the wetland habitat at Lough Derg (Shannon) SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.</i></p> |

### 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 entire development site lies within hectads N01 and N11.

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

Table 7-9 Breeding Bird Atlas Data (Hectads N01 and N11)

| Species Name                                | Breeding Atlas 68-72 |      | Breeding Atlas 88-91 |       | Breeding Atlas 07-11 |       | Conservation Status |
|---|----------------------|------|----------------------|-------|----------------------|-------|---------------------|
|   | N01                  | N11  | N01                  | N11   | N01                  | N11   |                     |
| Nightjar ( <i>Caprimulgus europaeus</i> )   | Poss                 | Prob | -                    | -     | -                    | -     | BD, RL              |
| Dunlin ( <i>Calidris alpina</i> )           | -                    | -    | -                    | -     | -                    | Non-B | RL                  |
| Hen Harrier ( <i>Circus cyaneus</i> )       | Conf                 | Conf | -                    | -     | -                    | Non-B | BD                  |
| Corncrake ( <i>Crex crex</i> )              | Conf                 | Prob | Breed                | -     | Conf                 | -     | BD, RL              |
| Kingfisher ( <i>Alcedo atthis</i> )         | Conf                 | Conf | Seen                 | Seen  | Poss                 | Poss  | BD                  |
| Marsh Harrier ( <i>Circus aeruginosus</i> ) | -                    | -    | -                    | -     | Non-B                | Non-B | BD                  |
| Barn Owl ( <i>Tyto alba</i> )               | Conf                 | Conf | Seen                 | -     | Poss                 | -     | RL                  |
| Quail ( <i>Coturnix coturnix</i> )          | -                    | -    | Seen                 | -     | Prob                 | Poss  | RL                  |
| Grey Partridge ( <i>Perdix perdix</i> )     | Conf                 | Conf | -                    | Breed | Poss                 | Conf  | RL                  |
| Redshank ( <i>Tringa totanus</i> )          | -                    | -    | Breed                | -     | Prob                 | Conf  | RL                  |
| Woodcock ( <i>Scolopax rusticola</i> )      | Conf                 | Conf | Seen                 | -     | Prob                 | Prob  | RL                  |
| Tufted Duck ( <i>Aythya fuligula</i> )      | -                    | -    | -                    | -     | Poss                 | Conf  | RL                  |
| Wigeon ( <i>Anas penelope</i> )             | -                    | -    | Seen                 | -     | -                    | Prob  | RL                  |
| Pochard ( <i>Aythya ferina</i> )            | -                    | Conf | -                    | -     | -                    | -     | RL                  |
| Red Grouse ( <i>Lagopus lagopus</i> )       | Conf                 | Conf | -                    | -     | -                    | -     | RL                  |

| Species Name                                  | Breeding Atlas 68-72 |      | Breeding Atlas 88-91 |       | Breeding Atlas 07-11 |       | Conservation Status |
|---|----------------------|------|----------------------|-------|----------------------|-------|---------------------|
|   | N01                  | N11  | N01                  | N11   | N01                  | N11   |                     |
| Lapwing ( <i>Vanellus vanellus</i> )          | Conf                 | Conf | Breed                | Breed | Conf                 | Conf  | RL                  |
| Curlew ( <i>Numenius arquata</i> )            | Conf                 | Conf | Breed                | Seen  | Conf                 | Non-B | RL                  |
| Black-headed Gull ( <i>Larus ridibundus</i> ) | Conf                 | -    | -                    | Seen  | Prob                 | Conf  | RL                  |
| Meadow Pipit ( <i>Anthus pratensis</i> )      | Conf                 | Conf | Breed                | Breed | Conf                 | Conf  | RL                  |
| Grey Wagtail ( <i>Motacilla cinerea</i> )     | Conf                 | Conf | Breed                | Breed | Conf                 | Prob  | RL                  |
| Whinchat ( <i>Saxicola rubetra</i> )          | -                    | -    | Seen                 | Seen  | Conf                 | -     | RL                  |
| Yellowhammer ( <i>Emberiza cintrinella</i> )  | Conf                 | Conf | Seen                 | Seen  | Poss                 | Prob  | 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

Six 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. Sixteen bird species have been recorded in hectads N01 and or N11 during past breeding bird atlas surveys which are listed on the BoCCI Red List.

Table 7-10 shows those species recorded in the relevant hectads (N01 and N11) 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 N01 & N11)

| Species Name  | Wintering Atlas 81-84 |     | Wintering Atlas 07-11 |      | Conservation Status |
|---|-----------------------|-----|-----------------------|------|---------------------|
|   | N01                   | N11 | N01                   | N11  |                     |
| Golden Plover ( <i>Pluvialis apricaria</i> )                          | Pres                  | -   | Pres                  | Pres | BD, RL              |
| Whooper Swan ( <i>Cygnus cygnus</i> )                                 | Pres                  | -   | Pres                  | Pres | BD                  |
| Hen Harrier ( <i>Circus cyaneus</i> )                                 | -                     | -   | Pres                  | Pres | BD                  |
| Greenland White-fronted Goose ( <i>Anser albifrons flavirostris</i> ) | -                     | -   | Pres                  | Pres | BD                  |
| Kingfisher ( <i>Alcedo atthis</i> )                                   | Pres                  | -   | Pres                  | Pres | BD                  |
| Little Egret ( <i>Egretta garzetta</i> )                              | -                     | -   | Pres                  | Pres | BD                  |
| Peregrine ( <i>Falco peregrinus</i> )                                 | Pres                  | -   | Pres                  | -    | BD                  |
| Merlin ( <i>Falco columbarius</i> )                                   | Pres                  | -   | Pres                  | Pres | BD                  |
| Bar-tailed Godwit ( <i>Tyto alba</i> )                                | -                     | -   | Pres                  | -    | BD                  |
| Ruff ( <i>Philomachus pugnax</i> )                                    | -                     | -   | Pres                  | -    | BD                  |

| Species Name                                  | Wintering Atlas 81-84 |      | Wintering Atlas 07-11 |      | Conservation Status |
|---|-----------------------|------|-----------------------|------|---------------------|
|   | N01                   | N11  | N01                   | N11  |                     |
| Short-eared Owl ( <i>Tyto alba</i> )          | -                     | -    | Pres                  | -    | BD                  |
| Barn Owl ( <i>Tyto alba</i> )                 | Pres                  | -    | Pres                  | Pres | RL                  |
| Wigeon ( <i>Anas penelope</i> )               | Pres                  | -    | Pres                  | Pres | RL                  |
| Shoveler ( <i>Anas clypeata</i> )             | -                     | -    | Pres                  | -    | RL                  |
| Pintail ( <i>Anas acuta</i> )                 | -                     | -    | Pres                  | -    | RL                  |
| Pochard ( <i>Aythya ferina</i> )              | -                     | -    | Pres                  | Pres | RL                  |
| Tufted Duck ( <i>Aythya fuligula</i> )        | -                     | -    | Pres                  | Pres | RL                  |
| Lapwing ( <i>Vanellus vanellus</i> )          | Pres                  | Pres | Pres                  | Pres | RL                  |
| Redshank ( <i>Tringa totanus</i> )            | -                     | -    | Pres                  | Pres | RL                  |
| Goldeneye ( <i>Bucephala clangula</i> )       | -                     | -    | -                     | Pres | RL                  |
| Woodcock ( <i>Scolopax rusticola</i> )        | Pres                  | Pres | Pres                  | Pres | RL                  |
| Black-headed Gull ( <i>Larus ridibundus</i> ) | Pres                  | Pres | Pres                  | Pres | RL                  |
| Grey Partridge ( <i>Perdix perdix</i> )       | -                     | -    | Pres                  | Pres | RL                  |
| Curlew ( <i>Numenius arquata</i> )            | -                     | -    | Pres                  | Pres | RL                  |
| Dunlin ( <i>Calidris alpina</i> )             | -                     | -    | Pres                  | -    | RL                  |
| Meadow Pipit ( <i>Anthus pratensis</i> )      | Pres                  | Pres | Pres                  | Pres | RL                  |
| Grey Wagtail ( <i>Motacilla cinerea</i> )     | Pres                  | -    | Pres                  | Pres | RL                  |
| Yellowhammer ( <i>Emberiza cintrinella</i> )  | Pres                  | -    | -                     | -    | RL                  |

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

Eleven 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 seventeen bird species have been recorded in hectads N01 and or N11 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](http://www.biodiversityireland.ie)) and is accompanied by a guidance document (McGuinness et al. (2015).

The criteria for estimating a zone of sensitivity (i.e. ‘low’, ‘medium’, ‘high’ and ‘highest’) is based on a review of the behavioural, ecological and distributional data available for each species.

The majority of the development site is located within a *Low* bird sensitivity zone. A small area to the west of the Derrinlough briquette factory is located within an area with no data on bird sensitivity to wind energy. This area with no data available includes turbine T7. A small area to the east of the briquette factory is located within a *Medium* bird sensitivity zone. This area classified as a *Medium* bird sensitivity zone includes turbines T13 and T20. These areas were surveyed as part of the extensive survey scope.

### 7.3.4 Irish Wetland Bird Survey (IWeBS) Records

The study area is not covered by an IWeBS site and the nearest site (Cloghanhill) is located approximately 1.2km to the north of the development site boundary. Data from IWeBS sites in County Offaly has been used to estimate wintering populations of waterbirds identified as KORs. Datasets for the following sites were downloaded from [www.birdwatchireland.ie](http://www.birdwatchireland.ie) and reviewed:

#### Offaly IWeBS Sites

- Blackwater Railway Lake
- Boora Lakes – Back Lakes Finnamores
- Cloghanhill
- Little Brosna Callows
- Little Brosna Callows (aerial)
- Raheen Lough
- Shannon Callows
- Shannon Callows (aerial)
- Turraun Nature Reserve

Furthermore, detailed IWeBS data was received from Birdwatch Ireland on the 12<sup>th</sup> of September 2018, including data from all IWeBS survey sites within several kilometres of the development site. Species specific information is provided below in Section 7.6, where relevant.

### 7.3.5 NPWS Rare and Protected Species Dataset

An information request was sent to the NPWS requesting records from the Rare and Protected Species Database on the 14<sup>th</sup> of February 2019. A subsequent follow up email was sent in August 2019 requesting any newly recorded bird data which may have subsequently been made available. The sections below provide the records obtained from the NPWS from the most recent data request response (30<sup>th</sup> December 2019) regarding rare and protected bird species.

#### Corncrake

The NPWS identified that there were two historical records of corncrake within the hectad N01 from a survey in 2010. These birds were recorded between 3-5km from the development boundary. It is believed that the records of corncrake from these surveys occurred exclusively along the Shannon Callows, several kilometres to the west of the development site, during the 2010 breeding season. Furthermore, this species has experienced a severe decline in recent years with breeding pairs very rare. It is highly unlikely that the development site or surrounding areas have the potential to support breeding corncrake populations.

## Curlew

The NPWS identified one confirmed breeding curlew pair in 2017 within the 10km hectad N01. This confirmed breeding curlew pair was recorded between 3-5km from the development boundary.

### 7.3.6 Literature Review

A review of relevant literature that detailed sensitive breeding records for the development site was undertaken as part of the desk study for the development site. Due to the confidential nature regarding this information, detail from the literature review has been placed in Confidential Appendix 7.5.

## 7.4 Field Survey Results

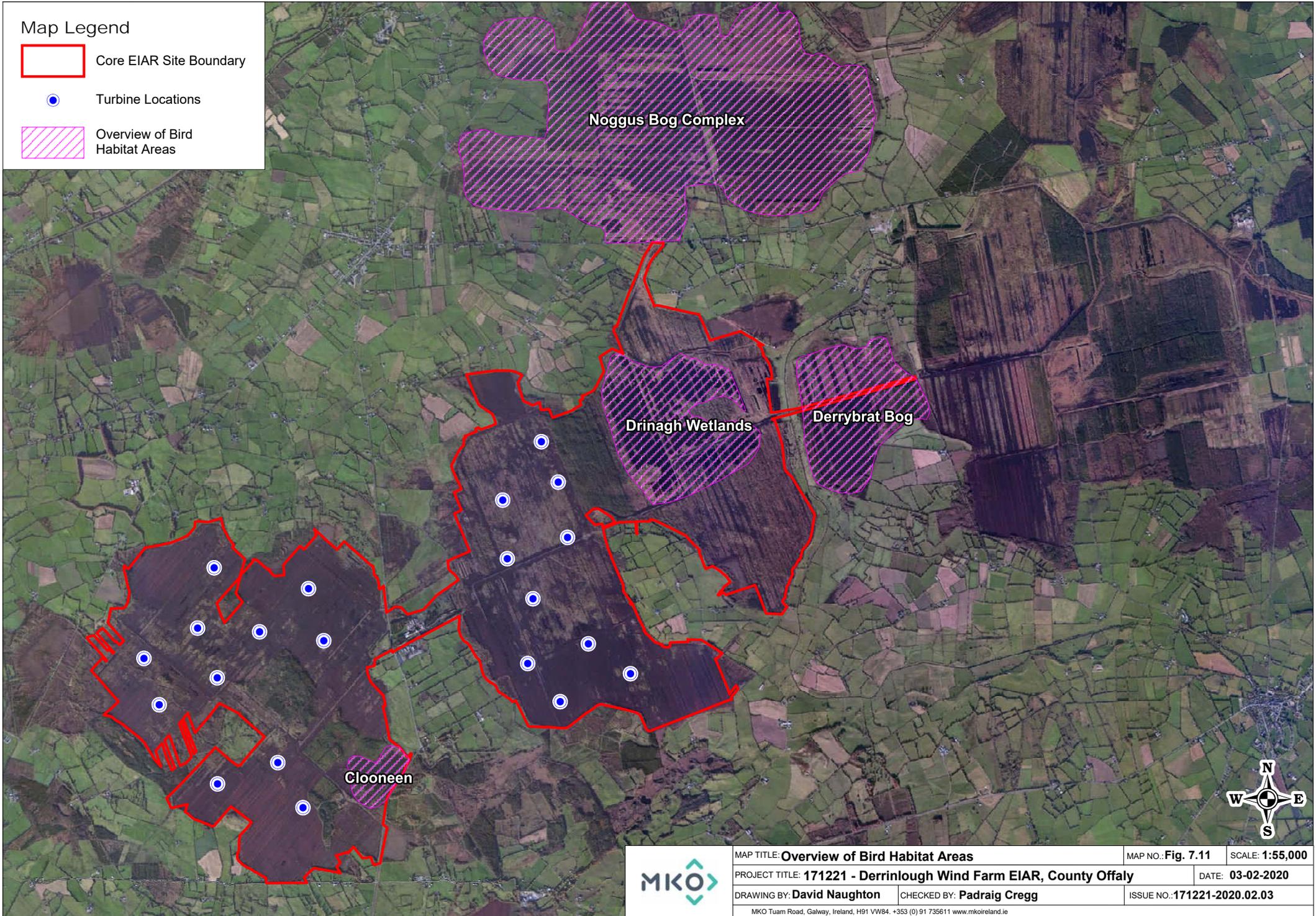
A comprehensive list of all bird species recorded during surveys is provided in Table 2 of Appendix 7.1. The target species listed below were recorded within the zone of influence of the Proposed Development during the ornithological surveys. The list is ordered in accordance with conservation significance: Annex I species, SCIs of designated sites, Red listed species and raptors.

- > Whooper Swan (Annex I species)
- > Golden Plover (Annex I species)
- > Red-necked Phalarope (Annex I species)
- > Hen Harrier (Annex I species)
- > Common Crane (Annex I species)
- > Kingfisher (Annex I species)
- > Little Egret (Annex I species)
- > Marsh Harrier (Annex I species)
- > Merlin (Annex I species)
- > Peregrine (Annex I species)
- > Lapwing (Red listed with regard to Breeding and Wintering populations)
- > Black-headed Gull (Red listed with regard to Breeding populations)
- > Herring Gull (Red listed with regard to Breeding populations)
- > Woodcock (Red listed with regard to Breeding populations)
- > Curlew (Red listed with regard to Breeding and Wintering populations)
- > Dunlin (Red listed with regard to Breeding and Wintering populations)
- > Redshank (Red listed with regard to Breeding and Wintering populations)
- > Shoveler (Red listed with regard to Wintering populations)
- > Tufted Duck (Red listed with regard to Wintering populations)
- > Wigeon (Red listed with regard to Wintering populations)
- > Long-eared Owl (Raptor, Schedule IV of the Wildlife Act; 1976)
- > Buzzard (Raptor, Schedule IV of the Wildlife Act; 1976)
- > Sparrowhawk (Raptor, Schedule IV of the Wildlife Act; 1976)
- > Kestrel (Raptor, Schedule IV of the Wildlife Act; 1976)
- > Snipe (Amber listed with regard to Breeding and Wintering populations)
- > Ringed Plover (Green listed with regard to Breeding & Wintering populations)
- > Teal (Amber listed with regard to Breeding and Wintering populations; SCI of River Little Brosna Callows SPA)
- > Black-tailed Godwit (Amber listed with regard to Wintering populations; SCI of River Little Brosna Callows SPA)

The following sections describe the observations of each target species under the individual survey headings. There are several defined areas utilised by birds which are mentioned throughout this chapter. The locations of these areas in relation to the development site can be found on Figure 7.11. Survey data and mapping for each target species is provided in the technical appendices (Appendices 7-2 to 7-5). Appendix 7.3 presents results summary tables including:

Map Legend

-  Core EIAR Site Boundary
-  Turbine Locations
-  Overview of Bird Habitat Areas



|   |   |                                  |                                     |
|---|---|----------------------------------|-------------------------------------|
|  | MAP TITLE: <b>Overview of Bird Habitat Areas</b>  | MAP NO.: <b>Fig. 7.11</b>        | SCALE: <b>1:55,000</b>              |
|   | PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR, County Offaly</b>                      | DATE: <b>03-02-2020</b>          |                                     |
|   | DRAWING BY: <b>David Naughton</b>   | CHECKED BY: <b>Padraig Cregg</b> | ISSUE NO.: <b>171221-2020.02.03</b> |
|   | <small>MKO Tuam Road, Galway, Ireland, H91 VW84. +353 (0) 91 735611 www.mkoireland.ie</small> |                                  |                                     |

- 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/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.

### Vantage Point Surveys

Whooper swan were recorded in flight on 62 occasions during Vantage Point Surveys (see Appendix 7.4, Figure 7.1.1). Twenty-nine observations occurred during the 2018/2019 winter season, between October 2018 and December 2018. The maximum flock size recorded during the 2018/2019 winter season was eight birds. The remaining 33 observations occurred during the 2017/2018 winter season, between October 2017 and February 2018. The maximum flock size recorded during the 2017/2018 winter season was 227 birds. All records of large whooper swan flocks from the 2017/2018 winter season were associated with birds roosting at the Drinagh wetlands, more than 500m east of the nearest turbine. Only seven of the 62 observations occurred within the potential collision risk zone of swept turbines.

Twenty-seven of the 62 flights occurred within 500m of the proposed turbine layout. Thirty-one observations were noted by the surveyor as birds travelling over the proposed development site. Thirty-one observations were of birds landing or flying from areas of flooded cutover bog (see Appendix 7.4, Figure 7.1.1).

In addition to the 62 observations of birds in flight, there were also thirteen observations of whooper swan either heard calling but not seen or observed roosting, feeding and or preening on flooded areas of cutover bog. Observations ranged from a pair to a flock of 163 birds. On the 13<sup>th</sup> of December 2017 a flock of 163 whooper swan were recorded preening on ponds to the east of the Drinagh wetlands, while a flock of 61 birds were also recorded roosting at the Drinagh wetlands on the same day.

### Winter Transect/Waterfowl Surveys

Whooper swan were recorded on 53 occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.1). Fifty-two of the 53 observations occurred between October 2018 and March 2019, while there was one observation from September 2019. Numbers recorded ranged from individuals to a maximum flock of 24 birds.

Five distinct roosting/foraging areas for whooper swan were recorded within one kilometre of the development site, three of which were within proximity of the development footprint, while birds were also recorded at the Drinagh wetlands and Noggus which is located to the north of the proposed development boundary. The majority of all roosting and foraging activity occurred around the Drinagh wetlands to the east of turbines with 21 observations in this area including all observations of large flocks (see Figure 7.7.1.1 in Appendix 7.4).

In addition, there were five observations of whooper swan recorded during winter transect surveys from the 2017/18 winter season. All five observations occurred around the Drinagh Wetlands east of the turbines. Three observations occurred during a survey on the 11th of November 2017 while there were two further observations from the 25th of January 2018.

### Migratory Bird Surveys

Whooper Swan were only recorded on eleven occasions during Migratory Bird Surveys along the River Shannon and Little Brosna River between September 2018 and September 2019 (see Appendix 7.4, Figure 7.8.1). No evidence of birds commuting between the proposed development and the River Shannon or Little Brosna River was recorded. Only four of the eleven observations consisted of birds seen flying in the general direction to or from the proposed development site, while the remaining seven observations consisted of birds seen in flight over the Shannon to the north of Banagher. Numbers recorded ranged from a pair to a flock of 29.

### Incidental Observations

There were two incidental observations of whooper swan during Hen Harrier Roost Surveys. On the 26<sup>th</sup> of October 2018 during a survey at HHVP6 a flock of eight swans were seen travelling towards the development site. On the 21<sup>st</sup> of March 2019 during a survey at HHVP3 a flock of eight swans were seen roosting on a flooded area of cutover bog at Derrybrat to the east of turbines. There were no additional observations of this species during any of the other comprehensive surveys.

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5. Relevant records pertaining to Whooper Swan are outlined below.

- **2014/15 Winter Season:** Whooper swan were recorded flying over or within Clongawny Bog (west of briquette factory) on six dates during the 2014/15 winter season in small flocks (maximum eight birds). This species was more regularly recorded at Drinagh Bog (east of briquette factory), observed on 13 dates through the winter though again mostly in small numbers (>10 birds). A flock of 50+ swans was present on the 12<sup>th</sup> of November 2014.
- **2015/16 Winter Season:** Whooper swan were recorded flying over or within Clongawny Bog on three dates during the winter season in small flocks (maximum eight birds). Birds were more regularly recorded at Drinagh Bog, observed on six dates through the winter though again mostly in small numbers (maximum 11 birds).
- **2016 Breeding Season:** A single whooper swan was present from the 12<sup>th</sup> of April to at least the 9<sup>th</sup> of May 2016. While not appearing injured, the bird may have suffered an injury to prevent it from migrating to the breeding grounds.
- **2016/17 Winter Season:** Whooper swan were recorded flying over or within Clongawny Bog on four dates during the winter season in small flocks (maximum eight birds). Birds were much more frequently recorded at Drinagh Bog, observed on several dates throughout the winter in larger flocks (up to 33 birds in November, but in separate flocks of no greater than ten birds per group).

## 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 33 occasions during Vantage Point Surveys (see Appendix 7.4, Figure 7.1.2). Twenty-three of the 33 flights occurred within the potential collision risk zone for turbine swept area. All observations of golden plover occurred during the winter months (October – April), only a few observations occurred during April which was likely to be from a lingering wintering population.

Fourteen of the 33 flights were recorded during the 2017/2018 winter season, while the remaining 19 observations occurred during the 2018/2019 winter season (October – April). Observations ranged from flocks of three to 220 birds. Six of the 33 flights were of flocks of golden plover observed more than 500m to the east of the proposed turbines over the Drinagh wetlands. Much of the golden plover flight activity is associated with a discrete few areas of suitable habitat or involved birds traveling between these areas (See Appendix 7.4, Figure 7.1.2).

In addition to the 33 observations of birds in flight, there were also three observations of birds which were not seen in flight. On the 9<sup>th</sup> of January 2018, a flock of golden plover were heard calling while in flight during a survey at VP6 to the north of the site, these birds were not seen. On the 25<sup>th</sup> of October 2017, a flock of 16 golden plover were observed roosting on bare peat within the development site and also within 500m of the proposed turbines. On the 15<sup>th</sup> of January 2018, a flock of 30 golden plover were observed resting on bare peat within the proposed development site and also within 500m of the proposed turbines.

### Breeding Bird Surveys

Golden plover were recorded on eight occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.1). Seven of the eight observations occurred during April 2018. The remaining observation occurred on the 9<sup>th</sup> of April 2019 as a flock of 60 birds were recorded travelling over the site. No evidence of breeding activity was recorded. All observations are likely to be associated with a lingering wintering population. Observations ranged from a pair of birds to a flock of 110 birds.

Four observations consisted of flocks roosting on areas of cutover bog, while the remaining four observations consisted of flocks in flight travelling over the development site.

### Winter Transect/Waterfowl Surveys

Golden plover were only recorded on eight occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.2). Five of the eight observations occurred during October 2018, while a single bird was seen foraging at an area of flooded cutover bog, to the north of the development site at Noggus bog on the 23<sup>rd</sup> of May 2019. Five observations occurred onsite and within 500m of the proposed turbine locations, within the Clongawny side of the development site. On the 3<sup>rd</sup> of October 2018 a flock of 46 birds were recorded in flight over the Drinagh wetlands to the east of proposed turbines. On the 5<sup>th</sup> of October 2018 a flock of ten golden plover were recorded roosting on an area of cutover bog in the northeast corner of the development site around the Stonestown area, more than 500m from the nearest proposed turbine. The largest flock recorded within the Clongawny section of the development site during these surveys was a flock of four birds.

### Migratory Bird Surveys

Golden plover were observed on 22 occasions during Migratory Bird Surveys between September 2018 and September 2019 (see Appendix 7.4, Figure 7.8.2). Nineteen of the 22 observations consisted of birds recorded in flight over the Shannon and adjacent grasslands, with evidence recorded of birds travelling to or from the direction of the development site. In addition, there were three observations of flocks of 70 – 550 birds recorded in flight around the Little Brosna River and Dovegrove Callows SPA to the south of the development site. None of these three observations indicate that these birds were

coming from or going to the proposed development area. Numbers recorded during Migratory Bird Surveys ranged from a flock of three birds to a flock of 2,000 birds.

### Incidental Observations

There was one incidental observation of golden plover between October 2017 and September 2019. On the 10<sup>th</sup> of December 2018 golden plover was recorded as an incidental during a Hen Harrier Roost Survey at HHVP6.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Golden plover were recorded flying over or within Clongawny Bog (west of briquette factory) on six dates during the 2014/15 winter season in small to large flocks (maximum 400 birds). This species was also recorded on six dates at Drinagh Bog (east of briquette factory), again in small to large flocks (maximum 62 birds). Most observations of this species were of birds travelling over the site and not utilising areas within Derrinlough for roosting or feeding on a regular basis.
- **2015/16 Winter Season:** Golden plover were recorded flying over or within Clongawny Bog on four dates during the 2015/16 winter season in small to large flocks (maximum 120 birds). This species was also recorded on seven dates at Drinagh Bog but with much larger flocks observed (maximum 345 birds).
- **2016/17 Winter Season:** Golden plover were recorded flying over or within Clongawny Bog on four dates during the 2016/17 winter season in small to large flocks (maximum 600 birds). Birds were much more frequently recorded at Drinagh Bog, observed on ten dates throughout the winter in small to large flocks (maximum flock of c.1,000 birds).
- **2017 Breeding Season:** Golden plover were recorded once during the 2017 breeding season as a flock of c.40 birds flew over Clongawny bog on the 21<sup>st</sup> of April.

## 7.4.3 Red-necked Phalarope

Raw Survey data for red-necked phalarope is provided in Confidential Appendix 7.5.

### Breeding Bird Surveys

Red-necked phalarope were only recorded twice during Breeding Bird Surveys (see Appendix 7.5, Figure 7.3.2). One observation occurred on the 19<sup>th</sup> of June while the other occurred on the 21<sup>st</sup> of June 2018. These were presumed to be the same individual. Further details are provided in Confidential Appendix 7.5.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results from the 2014/15, 2015/16, 2016/17 and 2017/18 are all located in Appendix 7.7. Due to the sensitive nature of some of the

observations during both the 2016 and 2017 breeding seasons, these reports have been redacted and placed in Confidential Appendix 7.5.

#### 7.4.4 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 21 occasions during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.3). Only seven of the 21 observations of birds in flight occurred within, or partially within, 500m of the proposed turbine layout. The majority of hen harrier flight activity occurred around the Drinagh wetlands to the east of the proposed turbines. All 21 observations were of individual birds in hunting flights over areas of cutover bog. Fourteen of the 21 observations occurred during the non-breeding season months (September – March), while there were seven observations during the core breeding season for hen harrier (April – August). All observations from the core breeding season consisted of ringtails (female or juvenile birds). No males were observed during this survey period and no evidence of breeding was recorded.

Five observations were recorded during the 2017/18 winter season, between the months of October and February. Four observations were recorded during the 2018 breeding season, between the months of May and August. Nine observations occurred during the 2018/19 winter season, between the months of October and March. Finally, there were three observations of a female hen harrier hunting around the Drinagh wetlands to the east of the proposed turbines in early August 2019.

Only two of the 21 flights occurred within the Potential Collision Height (PCH), while the remaining 19 observations occurred below the potential lowest rotor swept height.

##### Breeding Bird Surveys

Hen harrier were only recorded once during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.3). An adult male was seen in a hunting flight on the 14<sup>th</sup> of June 2019 in the northwest corner of the development site, more than 500m from the nearest turbine, before flying away to the west.

##### Hen Harrier Roost Surveys

Hen harrier were recorded on six occasions during dedicated Hen Harrier Roost Surveys from the 2018/19 winter season (see Appendix 7.4, Figure 7.6.1). On the 5<sup>th</sup> of December 2018 a hen harrier was recorded flying into a potential wintering night roost at dusk, approximately 1.3km from the development site boundary and approximately 4km from the nearest proposed turbine. Approximately seven minutes later the bird took flight and was recorded leaving the area. There were a further three observations on the 20<sup>th</sup> of February 2019 of a female hen harrier hunting and in flight around this previously identified roost site from the 5<sup>th</sup> of December. In addition, a hen harrier was recorded in a travelling/non-hunting flight on the 18<sup>th</sup> of December 2018 in an area several kilometres from the identified roost site, approximately 500m from the development site.

A second potential wintering night roost was identified during a Winter Transect/Waterfowl Survey on the 28<sup>th</sup> of January 2019. The location of both potential hen harrier winter roosts are shown on Figure 7.6.1.1 in Appendix 7.4. No roosts were found to be in use on more than one occasion during the extensive surveys undertaken.

## Winter Transect/Waterfowl Surveys

Hen harrier were recorded on five occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.3). Four of the five observations consisted of a female hunting and in flight over areas of cutover bog. On the 28<sup>th</sup> of January 2019 a male hen harrier was seen flying over an area of cutover bog before landing on an area of raised bog and rank heather to roost (see Figure 7.6.1.1 in Appendix 7.4). This roost location was within the development site and approximately 500m from the proposed turbines. This site was not found to be in use on subsequent visits.

Four observations occurred onsite and within 500m of the proposed turbine locations, predominantly around areas of cutover bog surrounding the briquette factory. The remaining observation occurred on the 4<sup>th</sup> of March 2019 as a female was seen hunting at Noggus bog, to the northeast of the development site.

## Incidental Observations

There were three incidental observations of hen harrier during Migratory Bird Surveys along the Shannon between September 2018 and September 2019 (see Appendix 7.4, Figure 7.8.3). A male hen harrier was noted hunting along a reedbed within the Shannon Callows on the 12<sup>th</sup> of September and again on the 21<sup>st</sup> of September 2018 within the same area during surveys at CMVP3. In addition, there was also an observation of a female hen harrier hunting along the Shannon during a survey at CMVP4 on the 9<sup>th</sup> of September 2019. On the 24<sup>th</sup> of September 2019 during a Winter Transect/Waterfowl Survey a female hen harrier was recorded hunting on two occasions over an area of cutover bog close to VP7.

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

## Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Hen harrier were recorded at Drinagh bog on eleven dates during the 2014/15 winter season, involving at least three individuals. There was no evidence of night roosting recorded on site. This species was not recorded on the Clongawny bog (west of the briquette factory).
- **2015/16 Winter Season:** Hen harrier were recorded at Drinagh bog on five dates during the 2015/16 winter season, involving at least three individuals. There was only one record of hen harrier at Clongawny bog as an individual was seen hunting over an area of intact bog on the 16<sup>th</sup> of January 2016. There was no evidence of night roosting recorded on site.
- **2016 Breeding Season:** Hen harrier were recorded at Drinagh bog twice on during the 2016 breeding season. On the 26<sup>th</sup> of July a male was seen hunting over the western margin of the Drinagh wetlands before flying over conifer plantation. On the 5<sup>th</sup> of August a male (possibly the same bird) was seen hunting over the reedbeds. This species was not recorded on the Clongawny bog.
- **2016/17 Winter Season:** Hen harrier were recorded at Drinagh bog on seven dates during the 2016/17 winter season, involving at least three individuals. There was no evidence of night roosting recorded on site. This species was not recorded on the Clongawny bog.
- **2017 Breeding Season:** Hen harrier were recorded at Drinagh bog once during the 2017 breeding season. A male bird was seen hunting over reedbeds in the northeast corner of the Drinagh wetlands on the 25<sup>th</sup> of August 2017. This species was not recorded on the Clongawny bog.

## 7.4.5 Common Crane

Raw Survey data for common crane is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Common crane were recorded in flight on five occasions during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.4). All five observations occurred during the 2018/19 winter season, between December 2018 and March 2019. Two of the five observations occurred at the Potential Collision Height (PCH). A group of four birds were observed travelling over the site and landing on areas of flooded cutover bog within the development site and close proximity of the development infrastructure on three occasions between December 2018 and February 2019. The remaining two observations were of a single bird observed twice on the 7<sup>th</sup> of March 2019, leaving the development site after dawn where the individual was roosting overnight, before travelling east. Observations of this species indicate that the birds were using the area as an overnight roost, but no evidence of feeding or loafing occurred within the development site was recorded during daylight hours.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Common crane were not recorded during surveys between October 2014 and September 2017.

## 7.4.6 Kingfisher

Raw Survey data for kingfisher is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Kingfisher were only recorded twice during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.5). Both observations occurred in the same area to the east of the Drinagh Wetlands, just south of VP9, more than 2.5km east of the nearest proposed turbine. On the 20<sup>th</sup> of September 2018 an individual was recorded travelling over an area of cutover bog, while on the 19<sup>th</sup> of September 2019 an individual kingfisher was recorded landing on a bulrush stem and fishing in an area of flooded cutover bog.

### Breeding Bird Surveys

Kingfisher were only recorded on three occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.4). All three observations occurred around the periphery of the site boundary, two of which were on the western edge of the development site while the other occurred in the Stonestown townland to the north of the site. On the 21<sup>st</sup> of June 2018 an individual bird was recorded travelling along a drainage ditch. The remaining two observations were of individual birds recorded in flight during the 2019 breeding season. No evidence of breeding activity was recorded during either the 2018 or 2019 season surveys.

## Winter Transect/Waterfowl Surveys

Kingfisher were only recorded twice during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.4). Both observations occurred in the same area to the east of the Drinagh Wetlands, more than 2km east of the nearest proposed turbine. On the 3rd of October 2018 an individual was recorded travelling over a drainage ditch, while on the 4th of March 2019 an individual kingfisher was observed beside a drainage ditch to the east of the Drinagh wetlands.

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

## Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** A kingfisher was recorded in an area of flooded bog at Clongawny on the 24<sup>th</sup> of November 2014, seen hunting and feeding. This species was not recorded at Drinagh Bog.
- **2015/16 Winter Season:** A kingfisher was recorded perched at an area of flooded bog at Clongawny on the 22<sup>nd</sup> of September 2015. This species was not recorded at Drinagh Bog.
- **2016 Breeding Season:** A kingfisher was recorded perched on a willow tree/scrub at a flooded are of cutover bog at Clongawny on the 22<sup>nd</sup> of June. This species was not recorded at Drinagh Bog.

### 7.4.7 Little Egret

Raw Survey data for little egret is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

## Vantage Point Surveys

Little egret were recorded in flight on 23 occasions during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.6). Only two of the 23 observations of birds in flight occurred within, or partially within, 500m of the proposed turbine layout. The majority of little egret flight activity occurred around the Drinagh wetlands to the east of the proposed turbines. Only three of the 23 flights occurred within the potential collision risk zone for turbine swept area.

Sixteen of the 21 observations were of individual birds travelling over or landing on areas of cutover bog. A pair of birds were recorded in flight together on four occasions, while a flock of five birds were also observed once during a VP survey on the 20<sup>th</sup> of November 2018. Eleven of the 23 observations occurred during the core breeding season (April – August). Two observations occurred during the 2017/18 winter season, between December and January. Five observations were recorded during the 2018 late breeding season/post-breeding dispersal period, between late July and August. Ten observations occurred during the 2018/19 winter season, between the months of October and January. Finally, there were six observations of little egret recorded between July and August 2019.

## Breeding Bird Surveys

Little egret was only recorded once during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.5). Two birds were seen foraging on a flooded area of cutover bog within the Drinagh wetlands on the 7<sup>th</sup> of June 2018. The observation occurred approximately one-kilometre east of the nearest turbine. No evidence of breeding activity was recorded in either breeding season surveyed.

## Winter Transect/Waterfowl Surveys

Little egret were recorded on 24 occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.5). Two observations occurred in August 2018, three in September 2018, while there 17 observations of little egret between October 2018 and March 2019. In addition, there was one observation of this species during a survey on the 3<sup>rd</sup> of May 2019 and one observation on the 3<sup>rd</sup> of September 2019. There were six observations of pairs of little egret, while the remaining 18 observations consisted of individual birds. Only two of the 24 observations were within 500m of the proposed turbine locations. Two observations occurred around the flooded area of cutover bog at Clooneen. Eleven observations occurred around the Drinagh wetlands to the east of the proposed turbines, while nine observations occurred at Noggus bog to the northeast.

## Migratory Bird Surveys

Little egret were only observed once during Migratory Bird Surveys between September 2018 to May 2019 (see Appendix 7.4, Figure 7.8.4). A single bird was recorded in flight on the 19<sup>th</sup> of February 2019, travelling over the Little Brosna River, several kilometres to the south of the development site.

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

## Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2015/16 Winter Season:** A little egret was recorded in flight over Drinagh Bog on the 10<sup>th</sup> of December 2015. This species was not recorded at Clongawny Bog.
- **2016/17 Winter Season:** A little egret was recorded on an area of flooded bog at Clongawny on the 12<sup>th</sup> of November 2016. There were two observations of individuals seen at Drinagh. One of these occurred on the 7<sup>th</sup> of November 2016 and the other occurred on the 9<sup>th</sup> of February 2017.
- **2017 Breeding Season:** A little egret was recorded on a flooded area of cutover bog at Clongawny on the 12<sup>th</sup> of September 2017.

### 7.4.8 Marsh Harrier

Raw Survey data for marsh harrier is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

## Vantage Point Surveys

Marsh harrier were only recorded twice during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.7). Both observations were of a juvenile bird observed hunting over the Drinagh wetlands on two occasions during a VP survey on the 25<sup>th</sup> of April 2019, more than 1.5km from the nearest proposed turbine.

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

## Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2017 Breeding Season:** A female hen harrier was recorded in flight over the Drinagh wetland on the 6<sup>th</sup> of June 2017. This species was not recorded at Clongawny Bog.

## 7.4.9 Merlin

Raw Survey data for Merlin is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Merlin were only recorded on four occasions during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.8). All four observations were of individual birds recorded in flight during the 2017/18 winter season between December 2017 and March 2018. Observations consisted of both male and female birds recorded hunting, perched and in flight on four separate survey dates between this period. Three of the four observations occurred within, or partially within 500m of the proposed turbine layout. All four flights occurred below the potential lowest rotor swept height.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Merlin was recorded on three occasions during the 2014/15 winter season surveys at Clongawny Bog, with the same individual possibly recorded on each occasion. This species was not recorded during surveys at Drinagh Bog during 2014/15.
- **2015/16 Winter Season:** Merlin was recorded on four occasions during the 2015/16 winter season surveys. Two observations occurred at Clongawny Bog and two at Drinagh Bog. Observations consisted of at least two individuals (i.e. one male and one female).
- **2016 Breeding Season:** A male merlin was observed perched on a peat pile in Clongawny on the 10<sup>th</sup> of August.
- **2016/17 Winter Season:** Merlin were recorded twice Drinagh Bog during the 2015/16 winter season. This species was not recorded during surveys at Clongawny Bog during 2016/17.
- **2017 Breeding Season:** An individual merlin was observed successfully hunting and killing a ringed plover at Clongawny Bog on the 16<sup>th</sup> of September 2017.

## 7.4.10 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 twenty occasions during Vantage Point Surveys (see Figure 7.1.9, Appendix 7.4). Nineteen of the twenty observations consisted of individual birds in flight, while a pair of birds were recorded in flight together and interacting with one another on the 26<sup>th</sup> of January 2018 during the non-breeding season. Seven of the twenty observations occurred during the core breeding season months (April – August). Four of which occurred during the 2018 breeding season and three

observations occurred during the 2019 breeding season. There were six observations of peregrine in flight during the 2017/18 winter season and seven observations from the 2018/19 winter season.

Ten flights occurred within, or partially within, 500m of the proposed turbine layout. Fifteen flights occurred within the Potential Collision Height (PCH), while the remaining five observations occurred below the potential lowest rotor swept height.

In addition, there two observations of peregrine perched on open bog and not in flight during VP surveys. On the 23<sup>rd</sup> of October 2017 a peregrine was seen perched on bog during a survey at VP7, while on the 14<sup>th</sup> of December 2017 a peregrine was seen perched on bog, again during a survey at VP7.

### Breeding Bird Surveys

Peregrine were only recorded once during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.6). An individual was recorded travelling over an area of cutover bog and agricultural grassland flying west over the southeast corner of the development site on the 2<sup>nd</sup> of May 2018.

### Breeding Raptor Surveys

Peregrine were only recorded twice during Breeding Raptor Surveys (see Appendix 7.4, Figure 7.4.1). On the 9<sup>th</sup> of July 2018 an individual was recorded circling and gliding over an area of forestry directly south of the development site before turning north and flying directly over the development site before travelling away to the northwest. On the 10<sup>th</sup> of July 2018 an individual was recorded in a low flight over an area of improved agricultural grassland more than 1.5km to the south of the development site.

### Winter Transect/Waterfowl Surveys

Peregrine were only recorded once during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.6). On the 6<sup>th</sup> of February 2019 a single peregrine was recorded carrying prey while in flight over the southeast corner of the development site within 500m of the proposed turbines.

### Migratory Bird Surveys

Peregrine were only observed once during Migratory Bird Surveys between September 2018 to September 2019 (see Appendix 7.4, Figure 7.8.5). A single bird was recorded in flight on the 12<sup>th</sup> of April 2019, travelling over an area of bog woodland and cutover bog, approximately 4km to the southwest of the proposed development site.

### Incidental Observations

There were two incidental observations of peregrine during Hen Harrier Roost Surveys. On the 22<sup>nd</sup> of October 2018 an individual peregrine was recorded flying above HHVP3, while on the 17<sup>th</sup> of December 2018 during a survey at HHVP2 an individual peregrine was recorded in flight.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Peregrine was recorded on three occasions during the 2014/15 winter season surveys at Clongawny Bog, with the same individual (male) possibly recorded on each occasion. This species was more regularly recorded at Drinagh Bog, observed on four dates through the winter season. Three observations were of individual birds in hunting or travelling flights over Drinagh. On the 5<sup>th</sup> of February 2015 a pair of peregrine were seen in flight together arriving from south before landing on bog and preening/interacting with one another. Both flew to edge of Drinagh wetland and continued preening.
- **2015/16 Winter Season:** Peregrine was recorded on two dates during the 2014/15 winter season surveys at Clongawny Bog. Observations consisted of a female and male seen on separate dates during winter months. This species was more regularly recorded at Drinagh Bog, observed on three dates through the winter season.
- **2016 Breeding Season:** Peregrine was only recorded once during the 2016 breeding season surveys. On the 9<sup>th</sup> of September a peregrine was seen in flight over Clongawny Bog.
- **2016/17 Winter Season:** Peregrine was recorded once during the 2014/15 winter season surveys at Clongawny Bog, as a female was seen perched on peat with prey on the 21<sup>st</sup> of January 2017. This species was more regularly recorded at Drinagh Bog, observed on four dates throughout the winter season.
- **2017 Breeding Season:** Peregrine was only recorded twice during the 2017 breeding season surveys. On the 28<sup>th</sup> of July a peregrine was seen circling high over Clongawny, while on the 12<sup>th</sup> of September a bird was seen flying over an area of cutover bog at Clongawny.

#### 7.4.11 Lapwing

Raw Survey data for lapwing is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

##### Vantage Point Surveys

Lapwing were recorded in flight on 195 occasions during Vantage Point Surveys. One-hundred and twenty-one of these observations occurred during the core breeding season months between April and August (see Figure 7.1.10a, Appendix 7.4). Forty-one observations occurred during the 2018 breeding season, while the remaining 80 observations occurred during the 2019 breeding season (April - August). Eighty-one of the 121 observations from breeding season months occurred within 500m of the proposed turbines. Most observations were of breeding birds (pairs or individuals) observed in flight below the potential collision height (i.e. below 25m). The majority of the observations during breeding season surveys occurred within 500m of the proposed turbines to the west of the briquette factory.

There were 74 observations of lapwing during non-breeding season months (September – March) (see Figure 7.1.10b, Appendix 7.4). Twenty-seven observations occurred during the 2017/18 non-breeding season (October – March) while 47 observations occurred during the 2018/19 non-breeding season, between September 2018 and March 2019. The maximum flock size recorded during VP surveys from the non-breeding season (September – March) was 206 birds. The majority of flight activity from the winter seasons was of large flocks flying over the development site. Only 22 of the 74 observations from the winter months occurred within 500m of the proposed turbines. The majority of flight activity occurred more than 500m from the proposed turbines around VP1 to the south and VP5 and VP6 to the northeast.

In addition to the 195 observations of birds in flight, there were six observations (seen or heard) of non-flying birds. Five of the six observations consisted of birds roosting and or feeding during non-breeding season months, while a lapwing was heard calling on numerous occasions throughout a survey at VP3 on the 16<sup>th</sup> of April 2019 but was not seen.

## Breeding Bird Surveys

Lapwing were recorded on 98 occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.7). There were 52 observations from the 2018 breeding season while there were 46 observations of lapwing during 2019 Breeding Bird Surveys.

Fifty-five of the 98 observations related to birds breeding, displaying, calling or pairs recorded in areas of suitable breeding habitat. Forty-three observations related to birds recorded flying over the site or roosting on wet areas of bog, with no evidence of breeding activity recorded. Twenty-one of these were of individual birds while the remainder consisted predominantly of pairs with some observations also of small flocks (3 – 35 birds).

There were 16 breeding territories within the development site or within 500m of the development boundary during 2018 Breeding Bird Surveys. In addition, there was one breeding pair at Derrybrat more than 2km to the east of the development infrastructure.

In 2019 there were 16 breeding territories recorded onsite or within 500m of the development boundary. In addition, there were three pairs at Derrybrat, more than 2km east of the development infrastructure, and ten lapwing pairs at Noggus, to the north of the site. The location of all 2018 breeding lapwing territories is provided in Figure 7.3.6.1, while the 2019 breeding territories are provided in Figure 7.3.6.2 in Appendix 7.4.

## Winter Transect/Waterfowl Surveys

Lapwing were recorded on 50 occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.7). Twenty-four observations occurred during the 2018/19 non-breeding season between August 2018 and February 2019, while there were 25 observations during the core 2019 breeding season months (March – May). In addition, there was a single observation of a flock of 17 lapwing roosting within the Drinagh wetlands during a survey in September 2019. The majority of observations from the winter months occurred around the Drinagh wetlands, while there were nine observations within the development site, including the Clooneen wetland and flooded areas of cutover bog to the west and east of the Briquette factory.

On the 27<sup>th</sup> of November 2018 two large flocks of 350 birds and 250 birds were both recorded roosting on areas around the Drinagh wetlands to the east of the proposed turbines. Furthermore, a flock of 400 birds were recorded flying over the Drinagh wetland on the 5<sup>th</sup> of November 2018. Large numbers of wintering lapwing are therefore dependant on the Drinagh wetland for foraging and roosting.

Only six of the 25 observations from the core breeding season (March – May) occurred onsite or within 500m of the development site. The vast majority of observations from the breeding season months occurred offsite around Noggus bog and Derrybrat to the northeast and east of the development infrastructure respectively.

On the 23<sup>rd</sup> of May 2019 a lapwing pair with three recently hatched chicks were recorded foraging around a flooded area at Noggus to the northeast of the development site. On the 27<sup>th</sup> of May 2019 a breeding pair were recorded incubating at a scrape/nest with four eggs at Derrybrat bog, to the east of the development infrastructure, before being disturbed by the surveyor and alarm calling.

Nineteen observations involved birds roosting on flooded areas of cutover bog. Eight observations related to breeding activity between March and May 2019.

In addition, there were 60 observations of lapwing during winter transect surveys from the 2017/18 winter season. Twelve observations occurred around the Clongawny area in the western section of the development site during a survey in January 2018. The remaining 48 observations occurred around the Drinagh Wetlands in the east of the development site. Forty-five observations occurred during a survey on the 11<sup>th</sup> of November 2017 while there were three observations from the 21<sup>st</sup> of March 2018.

## Migratory Bird Surveys

Lapwing were recorded on 24 occasions during Migratory Bird Surveys between September 2018 and September 2019 (see Appendix 7.4, Figure 7.8.6). Twenty observations occurred during the 2018/19 winter season between October 2018 and February 2019, while there was one observation of lapwing from August 2019 and three observations from September 2019. Twenty of the 24 observations consisted of birds recorded in flight over the Shannon, predominantly to the north of Banagher where the Grand Canal and River Brosna meet the Shannon. There was no indication during any of these observations that birds were travelling to or from the direction of the development site.

In addition, there were four observations of flocks of 4 – 500 birds recorded in flight around the Little Brosna River and Dovegrove Callows SPA to the south of the development site. None of the observations in this area indicated that these birds were coming from or going to the proposed development site.

## Incidental Observations

There were eight incidental observations of lapwing recorded across various surveys between October 2017 and September 2019. Four of which occurred during Crane dusk surveys in March 2019 close to VP4. There were two observations on the 7<sup>th</sup> of March and two observations on the 14<sup>th</sup> of March. There were two observations of a pair of lapwing recorded flying and calling while in flight over a flooded area at Noggus bog to the northeast of the development site, during a breeding raptor survey on the 16<sup>th</sup> of May 2018. On the 26<sup>th</sup> of June 2018, the surveyor made a casual observation prior to commencing a survey, of a flock of approximately 15 lapwing feeding and or roosting around the Drinagh Wetland within the north-eastern section of the development site, with no evidence of breeding activity observed. On the 21<sup>st</sup> of March 2019 an individual lapwing was recorded calling while in flight at Derrybrat to the east of the development infrastructure during a Hen Harrier Roost Survey at HHVP3.

## Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Lapwing was recorded frequently at Clongawny Bog during the 2014/15 winter season surveys, although a number of these observations were off-site including observations of flocks of c.135 and c.200 birds. Records of lapwing on-site included six observations of flocks of 40 – 100 birds. In addition, a lone lapwing was seen on an area of flooded cutover bog in February and March apparently holding a breeding territory. Lapwing were also frequently recorded at Drinagh Bog during the 2014/15 winter season, although many of these observations consisted of small parties flying across the site. A maximum flock size of 228 birds were seen at the Drinagh wetlands on the 13<sup>th</sup> of February 2015.
- **2015/16 Winter Season:** Lapwing was recorded on four dates during the 2015/16 winter season surveys at Clongawny Bog. Flock sizes recorded ranged from three to 120 birds. On the 20<sup>th</sup> of March 2016 three birds were on an area of flooded cutover bog with territorial/breeding behaviour observed. Lapwing was recorded more frequently at Drinagh Bog during the 2015/16 winter surveys, although many of the records were of relatively small parties flying across the site. On the 26<sup>th</sup> of September a flock of c.800 – 1,000 birds were seen circling high over the Drinagh wetlands before landing. In addition, an estimated 3-4 pairs of breeding/territorial lapwing were present at the Drinagh wetlands in March 2016.
- **2016 Breeding Season:** Lapwing was observed on four dates at Clongawny Bog during the 2016 breeding season, with evidence of breeding recorded on three of

these dates. There were four active breeding lapwing pairs at Drinagh Bog in late March 2016. It is considered that at least three of these pairs probably bred but the success rate is unknown. In addition, there was a non-breeding flock of c.90 birds recorded on the 23<sup>rd</sup> of June.

- **2016/17 Winter Season:** Lapwing was recorded on six dates during the 2016/17 winter season surveys at Clongawny Bog, with flocks sizes ranging between two and c.800 birds. On the 28<sup>th</sup> of March a pair were seen at an area of flooded bog indicating territorial/breeding behaviour. Lapwing was recorded more frequently at Drinagh Bog during the 2016/17 winter surveys, although many of the records were of relatively small parties flying across the site. Flock sizes recorded ranged from c.50 to c.700 birds, which were mostly recorded around the Drinagh wetlands.
- **2017 Breeding Season:** Two pairs of territorial/breeding lapwing were recorded at Clongawny Bog in April and early May. While the birds were still present into June, no further evidence of breeding activity was observed during this period. Likewise, at Drinagh Bog, two active breeding lapwing pairs were observed in April and May 2017, although breeding appeared to have failed for both pairs by late May. In addition, a flock of c.370 non-breeding birds were seen at the Drinagh wetlands on the 28<sup>th</sup> of September.

## 7.4.12 Black-headed Gull

Raw Survey data for black-headed gull is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Black-headed gull were recorded in flight on 217 occasions during Vantage Point Surveys (see Appendix 7.4, Figure 7.1.11). Two-hundred and four of these observations occurred during the core breeding season months between April and July. One-hundred and thirty-three of these observations occurred during the 2018 breeding season, while the remaining 71 observations occurred during the 2019 breeding season (April – July).

Only thirteen observations occurred outside of the core breeding season months for this species. Nine of these observations occurred during a VP survey on the 1<sup>st</sup> of March 2019. One observation occurred in August 2018, one in November 2018, one in February 2019 and one observation in August 2019. These observations are all likely to be associated with a lingering or an early establishing breeding population. Breeding activity was recorded within the development site in both 2018 and 2019.

Observations ranged from individuals to a flock of 40 birds. In total 86 of the recorded flights occurred within the Potential Collision Height (PCH).

### Breeding Bird Surveys

Black-headed gull were recorded on 49 occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.8). There were 27 observations from the 2018 breeding season while there were 22 observations during 2019 Breeding Bird Surveys. Eight observations indicated breeding activity as birds were seen and heard calling defending breeding territories or establishing breeding colonies. Twelve observations related to birds recorded roosting or foraging on flooded areas of cutover bog. Thirty-one observations related to birds recorded flying over the development site.

On the 2<sup>nd</sup> of May 2018, 300 black-headed gull were recorded in the early stages of establishing a breeding colony on an island in an area of flooded cutover bog to the east of the briquette factory within the development site. Nest scraps and territorial behaviour were recorded. However, the site was abandoned approximately a week later. There were also an additional five probable black-headed gull breeding territories onsite or within 500m of the development site. There was one probable breeding

pair in the Clooneen area, three probable breeding pairs west of the briquette factory and one probable breeding to the east of the briquette factory.

In 2019, six breeding pairs of black-headed gull were recorded onsite or within 500m the development area. Two breeding pairs were recorded within the Clooneen area, three breeding pairs were recorded within an area of flooded bog just west of the briquette factory and VP4, while there was also one possible breeding pair within the Drinagh wetlands. Furthermore, a slightly smaller breeding colony than that seen in 2018, established itself on Noggus bog, further details are provided in subsequent paragraphs.

Six distinctive breeding areas were identified across the combined 2018 and 2019 Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.8.1).

### Winter Transect/Waterfowl Surveys

Black-headed gull were recorded on 14 occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.8). Thirteen observations occurred between the 28<sup>th</sup> of April and 23<sup>rd</sup> of May 2019. On the 25<sup>th</sup> of February 2019 a pair of gulls were recorded around the Clooneen flooded area. There were three further observations of black-headed gull around this location between March and May 2019 as flock sizes of between five and eight birds were recorded roosting around the flooded area. A pair of black-headed gull were recorded at the Drinagh wetlands to the east of the proposed turbines on the 28<sup>th</sup> of March 2019. The remaining nine observations were related to a colony of approximately 150 birds attempting to establish a breeding colony and roosting at an area of flooded cutover bog, at Noggus northeast of the development site. Birds within the colony were recorded incubating eggs during surveys in late May.

### Migratory Bird Surveys

Black-headed gull were recorded on seven occasions during Migratory Bird Surveys between September 2018 and September 2019 (see Appendix 7.4, Figure 7.8.7). Six of the seven observations occurred during the 2018/19 winter season between October 2018 and February 2019, while there was one observation of a flock of ten birds recorded in flight over the Shannon on the 6<sup>th</sup> of August 2019. Three observations consisted of birds recorded in flight around the Dovegrove Callows SPA to the south of the development site, between October 2018 and January 2019. The remaining four observations all occurred along the River Shannon, to the north of Banagher, between February 2019 and August 2019. Flock sizes recorded ranged from 5 birds – 70 birds. No evidence of birds travelling to or from the direction of the development site was recorded during these surveys.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Black-headed gull was recorded on three occasions at Clongawny Bog during the 2014/15 winter season surveys. All three observations occurred between February and March 2015 with individuals seen in breeding plumage and indicating early breeding displays and territorial behaviour at an area of flooded bog. This species was observed twice at Drinagh Bog, as small flocks were seen in flight over the site in March 2015. There was no evidence of breeding activity recorded at Drinagh Bog
- **2015/16 Winter Season:** Black-headed gull was recorded twice at Clongawny Bog during the 2015/16 winter season surveys. Observations occurred between February

and March 2016 with individuals seen in breeding plumage and indicating early breeding displays and territorial behaviour at an area of flooded bog. This species was observed once at Drinagh Bog, as three birds were seen on a spit in the Drinagh wetlands on the 21<sup>st</sup> of March 2016.

- **2016 Breeding Season:** Breeding black-headed gull were recorded on three occasions at Clongawny Bog during the 2016 breeding season surveys. Peak numbers were recorded on the 9<sup>th</sup> of May 2016 as c.160 birds were observed with c.60 of which apparently on nests at Clooneen wetland. On the 22<sup>nd</sup> of June only c.20 gulls were present, including four fledged young. A number of nests/chicks may have been lost due to flooding caused by heavy seasonal rains. Breeding black-headed gull were also recorded at Drinagh Bog. Territorial birds were present in April and May with c.10 birds sitting on apparent nests on an island within the Drinagh wetlands. Birds had departed and abandoned breeding attempts in this area by June.
- **2016/17 Winter Season:** Black-headed gull was recorded once at Clongawny Bog during the 2016/17 winter season surveys. A flock of 36 gulls were observed in breeding plumage at Clooneen wetland on the 28<sup>th</sup> of March 2017, in breeding plumage and indicating early breeding displays and territorial behaviour. This species was not recorded at Drinagh Bog during the 2016/17 winter season.
- **2017 Breeding Season:** A breeding black-headed gull was recorded at Clooneen during the 2017 breeding season with a peak count of c.30 occupied nests on the 11<sup>th</sup> of May. By early June numbers had dropped to no more than c.15 nests, before the breeding colony abandoned the areas entirely by 22<sup>nd</sup> June, with only adult birds remaining. Fluctuating water levels and predation are both believed to have contributed to the failure of the colony. Breeding black-headed gull were also recorded at Drinagh Bog. Thirteen territorial birds were present at the Drinagh wetlands in April with a single occupied nest seen in early May. These birds had departed this area by the start of June 2017.

### 7.4.13 Herring Gull

Raw Survey data for herring gull is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

#### Vantage Point Surveys

Herring gull were recorded in flight on ten occasions during Vantage Point Surveys, seven of which occurred within PCH (see Appendix 7.4, Figure 7.1.12). Nine of the ten observations occurred between July and August 2018. Individuals to a maximum flock of five birds were recorded travelling over the development site. The remaining observations consisted of an individual in flight over an area of improved agricultural grassland and cutover bog to the north of the development site on the 23<sup>rd</sup> of November 2018.

Only one flight occurred within, or partially within 500m of the proposed turbine layout. Observations ranged from individuals to a flock of five birds.

#### Breeding Bird Surveys

Herring gull were only recorded once during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.9). A flock of three birds were recorded travelling over the development site on the 4<sup>th</sup> of May 2018. No evidence of breeding activity was recorded.

### Winter Transect/Waterfowl Surveys

Black-headed gull were only recorded once during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.9). A pair of birds were observed around the Drinagh wetlands to the east of the proposed turbines.

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

#### 7.4.14 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 recorded in flight on 30 occasions during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.13). Twenty-seven of the 30 observations occurred during the months of April and May with regular roding activity. Both individuals and pairs were recorded in flight. Fifteen observations occurred during VP surveys in May 2018 approximately at dusk, while the remaining twelve observations occurred during the 2019 breeding season between April and May.

Only three observations occurred during winter months. On the 22<sup>nd</sup> of December 2017 a woodcock was flushed. On the 19<sup>th</sup> of December 2018 a woodcock was recorded in flight while on the 7<sup>th</sup> of February 2019 a single woodcock was again recorded in flight. Twelve of the 30 observations occurred within, or partially within, 500m of the proposed turbine layout. All flight activity occurred below the potential lowest rotor swept height.

There were five distinct breeding areas where roding activity occurred with at least one breeding pair estimated per area. Three of these were within 500m of the proposed turbines while the other two were more than one kilometre to the east of the proposed turbine layout over the Drinagh wetlands and Derrybrat (see Appendix 7.4, Figure 7.1.13.1).

### Breeding Bird Surveys

Woodcock were only recorded twice during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.10). There was only one observation of woodcock from the 2018 breeding season while there was one observation from the 2019 Breeding Bird Surveys. On the 1<sup>st</sup> of May 2018 a single woodcock was flushed from an area of scrub to the east of the Drinagh wetlands, on the eastern edge of the site boundary. On the 11<sup>th</sup> of June 2019 an individual woodcock was recorded flying over the development site and within 500m of the proposed turbines.

### Breeding Woodcock Surveys

Woodcock were recorded on 71 occasions during dedicated Breeding Woodcock Surveys (see Appendix 7.4, Figure 7.5.1). As mentioned above, there were five distinct breeding areas where roding activity occurred with at least one breeding pair estimated per area. Twenty-nine observations occurred during the 2018 breeding season (June) while the remaining 42 observations occurred during the 2019 breeding season (May and June).

There were 18 flights of roding woodcock activity recorded on the 5<sup>th</sup> of June 2018 and eleven roding woodcock flights on the 28<sup>th</sup> of June 2018. There were twelve observations of roding woodcock on the 23<sup>rd</sup> of May 2019 and five observations on the 30<sup>th</sup> of May 2019. There were ten observations of roding woodcock on the 6<sup>th</sup> of June 2019 and seven observations on the 18<sup>th</sup> of June 2019. Lastly, there were

three observations of roding woodcock on the 25<sup>th</sup> of June 2019 and five observation on the 27<sup>th</sup> of June 2019.

### Winter Transect/Waterfowl Surveys

Woodcock were recorded on seven occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.10). All seven observations occurred between January and March 2019, consisting of individual birds which were flushed by the surveyor during walked transects. Four of the seven observations occurred within 500m of the proposed development footprint, while three observations occurred around the Drinagh wetlands to the east of the proposed turbines.

In addition, there was a single observation of woodcock during winter transect surveys from the 2017/18 winter season. The observation occurred during a winter transect survey in January 2018 around the Clongawny area in the western section of the development site.

### Incidental Observations

There were fifteen incidental observations of woodcock between October 2017 and September 2019. Ten of the eleven observations were recorded during Hen Harrier Roost Surveys from winter months when the populations of native breeding woodcock are greatly supplemented by wintering birds from eastern Europe.

The remaining five observations occurred during Migratory bird surveys. Four observations occurred during January 2019 as individual birds were recorded in flight several kilometres to the west and south of the development site. On the 23<sup>rd</sup> of May 2019 a roding male woodcock was observed in flight at dusk during a survey at CMVP1, several kilometres to the south of the development site.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2015/16 Winter Season:** Woodcock was recorded twice during winter season surveys at Clongawny Bog. Three woodcock were flushed from the edge of conifer woodlands and scrub on the 15<sup>th</sup> of Decemeber, and two more were flushed from the same approximate area on the 16<sup>th</sup> of January 2016. This species was not recorded at Drinagh Bog.
- **2016/17 Winter Season:** Woodcock was recorded once during winter season surveys at Clongawny Bog. On the 18<sup>th</sup> November a pair of woodcock were flushed from the edge of the track at the conifer plantation in the centre of the site. Woodcock were also recorded once during winter season surveys at Drinagh bog as a pair were flushed from a track on the 8<sup>th</sup> of November.

## 7.4.15 Curlew

Raw Survey data for curlew is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Curlew were recorded in flight on three occasions during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.14). All three observations occurred between July and August 2019, outside the core breeding season for this species. Each flight occurred in excess of 500m from the nearest proposed turbine. A single bird was recorded in flight over the Drinagh wetlands area more than one-kilometre east of the nearest proposed turbine, during a survey at VP8 on the 16<sup>th</sup> of July 2019. On the 1<sup>st</sup> of August 2019 a single bird was recorded in flight and alarm calling over an area of cutover bog northeast of VP1. On the 7<sup>th</sup> of August 2019 a flock of twelve curlew were recorded in flight leaving the Drinagh wetland area before circling and landing in area of agricultural grassland approximately one kilometre to the east of the nearest proposed turbine.

In addition to the three observations of birds in flight, there were also four observations of birds which were heard calling but not seen. On the 3<sup>rd</sup> of September 2018 an individual bird was heard calling from an area of flooded cutover bog near VP1. On the 16<sup>th</sup> of July 2019 during a survey at VP8 a bird was heard calling from the Drinagh wetlands. On the 11<sup>th</sup> of September during a survey at VP7 a bird was heard calling prior to the start of the survey before dawn. On the 13<sup>th</sup> of September 2019 during a survey at VP8 a bird was heard calling again from the Drinagh wetland area.

### Breeding Bird Surveys

Curlew were recorded on four occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.11). There were two observations of curlew from the 2018 breeding season while there were also two observations from the 2019 Breeding Bird Surveys. On the 7<sup>th</sup> of June 2018 a single curlew was flushed by the observer from a flooded area of cutover bog within the development site and within 500m of the proposed turbines. The individual remained calling while in flight over the area for six minutes following the disturbance. On the 12<sup>th</sup> of June 2018 a single curlew was heard calling from the Stonestown/Drinagh Wetland area but was not seen.

On the 11<sup>th</sup> of June 2019 an individual bird was recorded flying and calling over an area of cutover bog in the southeast corner of the development site. On the 20<sup>th</sup> of June 2019, two curlew were recorded roosting on an island at the Drinagh wetland to the east of the development infrastructure. While these observations occurred during the core breeding season, no evidence of breeding activity was recorded during either the 2018 or 2019 breeding seasons. The lack of observations of curlew earlier in the season (i.e. March to May inclusive), is a strong indication that these individuals were not associated with a breeding attempt on or near the site.

### Winter Transect/Waterfowl Surveys

Curlew were only recorded once during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.11). During a survey on the 5<sup>th</sup> of November a curlew was heard calling from an area of improved agricultural grassland to the southeast of the development site but was not seen.

### Migratory Bird Surveys

Curlew were recorded on seven occasions during Migratory Bird Surveys between September 2018 and September 2019 (see Appendix 7.4, Figure 7.8.8). All seven observations consisted of birds recorded in flight at two distinct areas along the River Shannon. Six of these observations occurred between October 2018 and January 2019, while there was a single observation of a flock of seven birds recorded in August 2019. Flock sizes recorded ranged from 15 – 40 birds. No evidence of birds travelling to or from the direction of the development site was recorded during these surveys.

## Incidental Observations

There was only one incidental observation of curlew between October 2017 and September 2019. On the 26<sup>th</sup> of June 2018, a flock of nine curlew were recorded roosting around the Drinagh wetland just north of the development site but within 500m of same, during a casual observation prior to a survey.

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

## Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2016 Breeding Season:** Curlew was recorded once during 2016 breeding season surveys at Drinagh Bog. A pair of curlew were seen on the 23<sup>rd</sup> of June 2016. Due to the time of this observation these birds are believed to be post-breeding birds (i.e. bred away from the site before moving on to wintering/non-breeding grounds). This species was not recorded at Clongawny Bog.
- **2017 Breeding Season:** Curlew was recorded once during 2017 breeding season surveys at Drinagh Bog. A flock of 26 non-breeding birds were observed on the Drinagh wetlands on the 28<sup>th</sup> of September 2017. This species was not recorded at Clongawny Bog.

### 7.4.16 Dunlin

Raw Survey data for Dunlin is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

#### Vantage Point Surveys

Dunlin were only recorded once during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.15). On the 25<sup>th</sup> of May 2018 an individual bird was recorded circling a flooded southern corner of the site just north of VP1. The bird was lost from view to the west of the proposed development area. The entire flight occurred more than 500m from the proposed turbine locations.

#### Winter Transect/Waterfowl Surveys

Dunlin were only recorded on one occasion during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.12). On the 23<sup>rd</sup> of May 2019 a flock of four birds were recorded foraging over flooded bog at Noggus bog to the northeast of the proposed development site.

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

## Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2017 Breeding Season:** Dunlin was recorded once during 2017 breeding season surveys at Drinagh Bog. A flock of 32 dunlin were seen in summer plumage on the 8<sup>th</sup> of May. Due to the nature and time of this observation these birds are believed to be birds on Migration between wintering and breeding grounds. This species was not recorded at Clongawny Bog.

### 7.4.17 Redshank

Raw Survey data for redshank is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

#### Breeding Bird Surveys

Redshank were recorded on 13 occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.12). There were nine observations of redshank from the 2018 breeding season while there were four observations from the 2019 Breeding Bird Surveys. All nine observations from the 2018 Breeding Bird Surveys occurred around the Drinagh Wetlands to the east of the proposed turbines. A breeding pair were seen and heard on several occasions throughout the breeding season.

Two of the four 2019 observations occurred at Derrybrat bog, more than 2km to the east of the proposed substation. The remaining two observations occurred around the Drinagh wetlands. A pair were suspected to have bred at both locations, although redshank breeding sites can be particularly difficult to locate.

#### Winter Transect/Waterfowl Surveys

Redshank were recorded on twelve occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.13). All twelve observations occurred between March and May 2019, which overlaps with the core breeding season period for this species. All twelve observations occurred within three breeding territories, none of which were located within the development footprint. The nearest of these occurred at the Drinagh wetlands in the east of the development site. The remaining two breeding territories were both more than 500m from the development infrastructure. One of these was at Noggus bog to the northeast, while the other was at Derrybrat to the east.

In addition, there were two observations of redshank during winter transect surveys from the 2017/18 winter season. Both observations occurred during a survey on the 21<sup>st</sup> of March 2018 around the Drinagh wetlands area.

#### Incidental Observations

There were four incidental observations of redshank between October 2017 and September 2019. Two of these observations were recorded during Vantage Point Surveys of birds not seen in flight. On the 3<sup>rd</sup> of September 2018 during a survey at VP1 an individual redshank was seen foraging at the edge of the Drinagh wetland area at 07:30am. On the 16<sup>th</sup> of April 2019 during a survey at VP3 a redshank was heard calling on numerous occasions throughout the survey but wasn't seen.

On the 21<sup>st</sup> of March 2019 during a Hen Harrier Roost Survey at HHVP3 a single redshank was seen flying and landing on a flooded area of cutover bog at Derrybrat more than 2km to the east of the

development infrastructure. On the 26<sup>th</sup> of June 2018 a casual observation of a group of four birds was recorded in the Drinagh wetland, within the development site. The birds were noted by the surveyor as two probable breeding pairs, while one bird exhibited clear agitated/territorial behaviour.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2015/16 Winter Season:** Redshank was recorded once during winter season surveys at Drinagh Bog. Up to six birds were at the Drinagh wetlands on the 21<sup>st</sup> of March 2016, with some birds showing signs of breeding behaviour. This species was not recorded at Clongawny Bog.
- **2016 Breeding Season:** Two pairs of breeding redshank were recorded during 2016 breeding season surveys at the Drinagh wetlands. Both pairs were highly territorial in May and early June, with a further 1-2 birds present which may have represented a third breeding pair. This species was not recorded at Clongawny Bog.
- **2016/17 Winter Season:** Redshank was recorded once during winter season surveys at Drinagh Bog. On the 27<sup>th</sup> of March 2017 three birds were recorded, believed to be a returning breeding population.
- **2017 Breeding Season:** At least one territorial redshank pair was recorded during 2017 breeding season surveys at the Drinagh wetlands. The pair was present in April and May, but quiet in the area by the 6<sup>th</sup> of June, indicating a failed breeding attempt.

## 7.4.18 Shoveler

Raw survey data for shoveler is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Shoveler were only recorded twice during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.16). Both observations occurred during the same survey at VP8 near Drinagh wetlands on the 25<sup>th</sup> of April 2019. A male was recorded in flight and landing on the flooded area near VP8, before two males and a female were recorded leaving the area and flying west towards the development site approximately one hour later.

Both flights occurred in excess of 1.5km from the nearest proposed turbine and were recorded flying below the potential lowest rotor swept height.

### Breeding Bird Surveys

Shoveler were only recorded once during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.13). On the 10<sup>th</sup> of April 2019 a flock of four birds were flying over an area of cutover bog, on the eastern edge of the Drinagh wetlands, more than one kilometre from the nearest proposed turbine.

### Winter Transect/Waterfowl Surveys

Shoveler were recorded on five occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.14). All five observations occurred between the 2<sup>nd</sup> of January and 3<sup>rd</sup> of May 2019.

Three observations occurred at Noggus bog, to the northeast of the development site where birds were recorded roosting on flooded areas of bog. On the 29<sup>th</sup> of April 2019 a single duck was recorded roosting on an area of flooded bog at Derrybrat, more than 2km to the east of the development infrastructure. The remaining observation occurred near the area of flooded bog at Clooneen. A flock of five shoveler were recorded.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2016 Breeding Season:** Shoveler was recorded twice during breeding season surveys at Drinagh Bog. On the 12<sup>th</sup> of April 2016 a pair were seen in an area of suitable breeding habitat at the Drinagh wetland, while only one bird was present in early May. This species was not recorded at Clongawny Bog.
- **2017 Breeding Season:** Shoveler was recorded once during breeding season surveys at Drinagh Bog. On the 8<sup>th</sup> of May 2017 a pair were seen in an area of suitable breeding habitat at the Drinagh wetland. This species was not recorded at Clongawny Bog.

## 7.4.19 Tufted Duck

Raw Survey data for tufted duck is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Tufted duck were only recorded in flight on two occasions during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.17). On the 18<sup>th</sup> of April 2018 a pair of ducks were recorded flying and landing on a flooded area of cutover bog within the Drinagh wetlands, approximately 1.5km from the nearest proposed turbine. On the 30<sup>th</sup> of April 2019 an individual bird was recorded flying and landing on a flooded area of cutover bog within the Drinagh wetlands, approximately one kilometre from the nearest proposed turbine.

Both flights occurred in excess of one kilometre from the nearest proposed turbine location and were recorded flying below the potential lowest rotor swept height.

In addition to the two observations of birds in flight, there were also four observations of non-flying birds. All four observations occurred during the 2017/18 winter season during surveys at VP5 overlooking the Drinagh wetlands. Birds were recorded feeding on flooded areas of Drinagh with flock sizes ranging between three and five birds between the 10<sup>th</sup> of October 2017 and the 24<sup>th</sup> of March 2018.

### Breeding Bird Surveys

Tufted duck were recorded on 20 occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.14). There were ten observations of tufted duck from the 2018 breeding season and ten observations from the 2019 Breeding Bird Surveys. All 20 observations consisted of individual birds or small flocks, maximum of eight birds, recorded roosting and or foraging on flooded areas of cutover bog.

Only two of the 20 observations occurred within 500m of the proposed turbine locations. Two observations occurred in the Clooneen wetland, while the remaining sixteen observations all occurred around the Drinagh wetlands to the east of the proposed turbines.

### Winter Transect/Waterfowl Surveys

Tufted duck were recorded on eleven occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.15). Numbers recorded ranged from an individual duck to a flock of seven birds. Observations occurred between the 2<sup>nd</sup> of January and 23<sup>rd</sup> of May 2019. Only one observation occurred within the development site or 500m of the proposed turbines. On this occasion a pair of birds were recorded on the 25<sup>th</sup> of February 2019. Three observations occurred at Noggus bog, to the northeast of the development site where birds were recorded roosting on flooded areas of bog. The remaining seven observations all occurred around the Drinagh wetlands to the east of the proposed turbines, as small flocks of birds were recorded roosting in the area.

In addition, there were fifteen observations of tufted duck during winter transect surveys from the 2017/18 winter season. All fifteen observations occurred with the Drinagh wetland area to the east of the development infrastructure. There were four observations of tufted duck on the 11<sup>th</sup> of November 2017, five observations from the 25<sup>th</sup> of January 2018 and six observations from the 6<sup>th</sup> of March 2018.

### Incidental Observations

There was one incidental observation of tufted duck between October 2017 and September 2019. On the 26<sup>th</sup> of June 2018, a casual observation of two broods of tufted duck were recorded at the Drinagh wetland area, just north of the development site but within 500m of same, prior to a survey.

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Tufted duck was recorded twice during winter season surveys at Drinagh Bog. On the 25<sup>th</sup> of March 2015 a flock of four ducks were observed, believed to be a returning breeding population. On the 6<sup>th</sup> of January 2015 a single bird was seen on water at the Drinagh wetlands. This species was not recorded at Clongawny Bog.
- **2015/16 Winter Season:** Tufted duck was recorded in both February and March 2016 during winter season surveys at Drinagh Bog as small flocks, believed to be a returning breeding population, arrived at the Drinagh wetlands. This species was not recorded at Clongawny Bog.
- **2016 Breeding Season:** Tufted duck was recorded during breeding season surveys at Clongawny Bog as a pair were seen on Clooneen wetland between April and July in an area of suitable breeding. Breeding may have occurred although there was no evidence of a nest or fledged young in later months. This species was also recorded at Drinagh Bog during the breeding season. Sixteen adults were seen on the Drinagh wetlands in April, with seven pairs seen in May. In June at least four breeding pairs were recorded with hatched chicks (one brood of eight).
- **2016/17 Winter Season:** Tufted duck was recorded in small numbers (>10 birds) between October and February with numbers increasing in March to sixteen birds, due to a returning breeding population, with territorial behaviour observed. This species was not recorded at Clongawny Bog.
- **2017 Breeding Season:** Tufted duck was recorded during breeding season surveys at Drinagh Bog between April and June. Up to 20 adults were observed in April on the Drinagh wetlands, some of which were in pairs, while there was an estimated six pairs

in May and at least two pairs with fledged young in June 2017. This species was not recorded at Clongawny Bog.

## 7.4.20 Wigeon

Raw Survey data for wigeon is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Wigeon were not recorded during Vantage Point Surveys between October 2017 and September 2019.

### Winter Transect/Waterfowl Surveys

Wigeon were recorded on ten occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.16). Numbers recorded ranged from an individual duck to a flock of 35 birds. Nine of the ten observations occurred between October 2018 and March 2019, while an individual duck was recorded during a survey on the 27<sup>th</sup> of September 2019. Only one observation occurred within the development site or 500m of the proposed turbines. On this occasion a flock of 19 birds were recorded on the 9<sup>th</sup> of January 2019. Three observations occurred around the Drinagh wetlands to the east of the proposed turbines, while the remaining six observations occurred around Noggus bog, more to the northeast of the development site. At Noggus, birds were recorded roosting and foraging.

### Migratory Bird Surveys

Wigeon were only recorded twice during Migratory Bird Surveys between September 2018 and September 2019 (see Appendix 7.4, Figure 7.8.9). On the 26<sup>th</sup> of November 2018 a flock of 16 birds were recorded travelling over the Shannon, to the west of the development site. On the 29<sup>th</sup> of January 2019 a flock of 90 birds were seen in flight over the Dovegrove Callows SPA to the south of the development site. No evidence of birds travelling to or from the direction of the development site was recorded during these surveys.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Wigeon was recorded on one occasion during winter season surveys at Clongawny Bog, as a flock of five birds were recorded on the 19<sup>th</sup> of November. A flock of sixty wigeon were also observed on Drinagh Bog, at the Drinagh wetlands, on the 27<sup>th</sup> of December 2015.
- **2015/16 Winter Season:** Wigeon was recorded on one occasion at Clongawny Bog during winter season surveys, as a pair of birds were seen in flight over the site on the 20<sup>th</sup> of October. Wigeon were more frequently recorded at Drinagh Bog, with observations occurring on four dates with a maximum flock of 33 birds recorded.
- **2016/17 Winter Season:** Wigeon was recorded on three survey dates at Drinagh Bog during winter season surveys, with a maximum flock of 22 birds recorded on the Drinagh wetlands on the 8<sup>th</sup> of December 2016.

## 7.4.21 Long-eared Owl

Raw Survey data for long-eared owl is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Long-eared owl were only recorded once during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.18). On the 9<sup>th</sup> of May 2019 an individual owl was recorded flying low overhead during a survey at VP1. The bird was noted to be travelling towards an area of forestry to the south of the development site at dawn. The flight occurred partially within 500m of the proposed turbines and was recorded flying below the potential lowest rotor swept height.

### Incidental Observations

There was one incidental observation of long-eared owl between October 2017 and September 2019. On the 19<sup>th</sup> of March 2019 a long-eared owl was heard calling at dusk after a Hen Harrier Roost Survey at HHVP2 near Black Lough, approximately 500m south of the development site.

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

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2016/17 Winter Season:** Long-eared owl was recorded on one occasion during winter season surveys at Clongawny Bog, as an individual was heard calling from conifer wood on site on the 27<sup>th</sup> of January 2017. This species was not recorded at Drinagh Bog.

## 7.4.22 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 recorded in flight on 433 occasions during Vantage Point Surveys between October 2017 and September 2019 (see Appendix 7.4, Figure 7.1.19). Two-hundred and eighty-five of these observations occurred during the core breeding season months between April and August, while there were 148 observations of buzzard during non-breeding season months (September – March). One-hundred and seventy observations occurred during the 2018 breeding season, while the remaining 115 observations occurred during the 2019 breeding season (April - August).

Thirty-two observations occurred during the 2017/18 non-breeding season (October – March) while 106 observations occurred during the 2018/19 non-breeding season, between September 2018 and March 2019. In addition, there were ten observations of buzzard in flight during VP surveys in September 2019.

The majority of the flight activity occurred within, or partially within 500m of the proposed turbines. Two-hundred and fifty-six of the 433 flights occurred within, or partially within, the Potential Collision

Height (PCH), while the remaining 177 observations occurred below the potential lowest rotor swept height.

In addition to the 433 observations of birds in flight, there were 16 observations (seen or heard) of non-flying birds during non-breeding season months. Twelve of the 16 observations consisted of birds perched on trees, telephone poles, etc. The remaining four observations consisted of birds heard calling but were not seen.

### Breeding Bird Surveys

Buzzard were recorded on 44 occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.15). There were 22 observations from the 2018 breeding season and 22 observations of buzzard during 2019 Breeding Bird Surveys. The majority of observations of buzzard during Breeding Bird Surveys occurred in areas of improved agricultural grassland or forested areas offsite but within 500m of the development boundary.

Six observations related to birds calling or pairs recorded in areas of suitable breeding habitat. Four of these observations occurred during the 2018 breeding season, while the remaining two occurred during the 2019 breeding season. On the 24<sup>th</sup> of May 2018 a buzzard was recorded carrying prey into an area of conifer plantation before settling in this area. This observation confirmed breeding in the area with a nest site likely to be located in the area of conifer plantation adjacent to the western boundary of the development site.

On the 20<sup>th</sup> of May 2019 a buzzard was recorded near an old nest within an area of conifer plantation to the south of the development site. This observation was noted as a possible breeding territory.

The location of both breeding territories from 2018 and 2019 can be seen on Figure 7.3.15.1 in Appendix 7.4.

### Breeding Raptor Surveys

Buzzard were recorded on 68 occasions during Breeding Raptor Surveys (see Appendix 7.4, Figure 7.4.2). Forty-six observations occurred during the 2018 breeding season, while the remaining 22 observations occurred during the 2019 breeding season (April – July). Observations occurred predominantly off-site and in two distinct areas. The majority of flight activity occurred either near an area of forestry directly south of the development site, or to the northeast near an area of grassland between Banagher and the development site. Three distinct breeding territories were identified, through observations of calling birds, prey deliveries and breeding displays (see Figure 7.4.2.1 in Appendix 7.4). One territory was located within an area of forestry to the south of the development site while there were two breeding territories located to the north of the development site in small copses of native broadleaf woodland.

### Winter Transect/Waterfowl Surveys

Buzzard were recorded on 27 occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.17). Numbers recorded ranged from an individual to a group of three birds recorded flying together. Observations occurred between September 2018 and March 2019. Observations of this species occurred predominantly within the development site and within 500m of the proposed turbine locations.

In addition, there were six observations of buzzard during winter transect surveys from the 2017/18 winter season. Four observations occurred near the Clongawny area in the western section of the development site. Two observations occurred during a survey in November 2017, one in January 2018 and one in March 2018. The remaining two observations occurred near the Drinagh Wetlands in the

east of the development site. One observation occurred during a survey on the 25<sup>th</sup> of January 2018 while the other observation occurred on the 21<sup>st</sup> of March 2018.

### Incidental Observations

There were fifteen incidental observations of buzzard between October 2017 and September 2019. Fourteen of the 15 observations occurred during Migratory Bird Surveys along the River Shannon, several kilometres to the west of the development site. Two observations occurred in September 2018 while the remaining twelve observations all occurred in January 2019. The remaining observation occurred during a Winter Transect/Waterfowl Survey on the 24<sup>th</sup> of September 2019. On this occasion, a pair of buzzard were recorded in flight travelling in a northeast direction.

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** One to two buzzards were present at Clongawny Bog throughout the winter season surveys. A displaying pair was also observed in February 2015, with three birds seen together on the 16<sup>th</sup> of February before landing in conifer plantation on site. One to two buzzards were present at Drinagh Bog throughout the winter season surveys, with six birds circling over the site on 10<sup>th</sup> of March and a party of four on the 19<sup>th</sup> of March 2015.
- **2015/16 Winter Season:** One to two buzzards were present at Clongawny Bog throughout the winter season surveys. A part of four were seen in a loose group on the 21<sup>st</sup> of September, with a displaying pair on site on the 15<sup>th</sup> of February. Buzzard were recorded at Drinagh Bog during all winter months except for October and November, with a pair seen together on several dates.
- **2016 Breeding Season:** Buzzard were present at Clongawny Bog throughout the 2016 breeding season surveys, with at least one young bird and two adults seen in August 2016. One to two buzzards were present at Drinagh Bog on several dates throughout the 2016 breeding season surveys. It is considered that buzzard breed locally, though not necessarily on site.
- **2016/17 Winter Season:** Buzzard were present at Clongawny Bog throughout the winter season surveys, predominantly individual birds, but occasional in small groups. Displaying birds were recorded in February and March, indicating localised breeding. Buzzard were regularly recorded at Drinagh Bog, during every month throughout the winter season surveys. Pairs were observed on several dates with up to four birds seen in March.
- **2017 Breeding Season:** Buzzard were present at Clongawny Bog throughout the 2017 breeding season surveys, with at least one successful breeding pair on site (young heard in late July). One to two buzzards were present at Drinagh Bog on several dates throughout the 2017 breeding season surveys. It is considered that buzzard breed locally, though not necessarily on site.

### 7.4.23 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 in flight on 57 occasions during Vantage Point Surveys (see Figure 7.1.20, Appendix 7.4). Twenty-six of these observations occurred during the core breeding season months between April and August, while there were 31 observations of sparrowhawk during non-breeding season months (September – March). Fourteen observations occurred during the 2018 breeding season, while the remaining twelve observations occurred during the 2019 breeding season (April - August).

Sixteen observations occurred during the 2017/18 non-breeding season (October – March) while thirteen observations occurred during the 2018/19 non-breeding season, between September 2018 and March 2019. In addition, a single sparrowhawk was recorded in flight during a VP survey on the 13<sup>th</sup> of September 2019.

The majority of the flight activity occurred within, or partially within 500m of the proposed turbines. Twenty-two of the 57 flights occurred within, or partially within, the Potential Collision Height (PCH), while the remaining 35 observations occurred below the potential lowest rotor swept height.

### Breeding Bird Surveys

Sparrowhawk were recorded on nine occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.16). There were five observations from the 2018 breeding season while there were four observations of sparrowhawk during 2019 Breeding Bird Surveys.

All five observations from the 2018 Breeding Bird Surveys consisted of individual birds recorded in hunting or travelling flights, with no indication of breeding behaviour.

All four observations from the 2019 breeding season occurred around the Drinagh wetlands. On the 10<sup>th</sup> of April 2019 a pair of sparrowhawk were seen in a displaying flight over an area of cutover bog and scrub to the east of the Drinagh wetlands. Three of the four observations from the 2019 breeding season occurred in April 2019 while the remaining observation on the 13<sup>th</sup> of May 2019 consisted of a female bird recorded in flight. There were no further observations of this species during the 2019 breeding season and no further indication of breeding activity.

### Breeding Raptor Surveys

Sparrowhawk were recorded on eleven occasions during Breeding Raptor Surveys (see Appendix 7.4, Figure 7.4.3). Six observations occurred during the 2018 breeding season, while the remaining five observations occurred during the 2019 breeding season (April – July). One observation occurred within the proposed development site in an area of forestry adjacent to the briquette factory. Five observations occurred to the south of the development site in areas of forestry, while three observations occurred near Noggus bog to the north of the development site.

A breeding territory was identified in June 2018 at Noggus bog to the north of the development site. A female bird was recorded carrying prey into a birch copse. A confirmed nest site was identified within the development site in July 2019. At this location three juveniles were seen and heard calling to a female sparrowhawk in an area of forestry adjacent to the briquette factory.

On the 9<sup>th</sup> of July 2018 a sparrowhawk was recorded mobbing a peregrine in an area of conifer plantation just south of the development site, approximately 500m from the nearest proposed turbine. This observation was considered defence of a breeding territory. On the 5<sup>th</sup> of June 2019 a female was recorded carrying prey while in flight before landing into an area of conifer plantation more than one kilometre to the south of the development site. This observation confirmed breeding nearby.

The location of all confirmed breeding territories and nest locations from the 2018 and 2019 breeding seasons are shown on Figure 7.4.3.1 in Appendix 7.4.

## Winter Transect/Waterfowl Surveys

Sparrowhawk were recorded on four occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.18). Observations occurred between November 2018 and March 2019, as individual birds were observed in hunting/travelling flights. All four observations occurred within the development site.

In addition, there was one observation of sparrowhawk from the 2017/18 winter transect surveys. During a survey in March 2018 a single sparrowhawk was recorded at the Clongawny area in the western section of the development site.

## Incidental Observations

There were seven incidental observations of sparrowhawk between October 2017 and September 2019. Four observations occurred during Migratory Bird Surveys, as individuals were seen in flight around the River Shannon, several kilometres to the west of the development site. One observation occurred in September 2019, while the remaining three observations all occurred in January 2019.

On the 7<sup>th</sup> of February 2019 a male was recorded in flight and landing in an area of scrub after a VP survey at VP7 as the surveyor was walking of the site. The remaining two observations occurred during Winter Transect/Waterfowl surveys in September 2019 as a female sparrowhawk in flight.

## Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Sparrowhawk were recorded on several dates between November and March at Clongawny Bog during winter season surveys, with some displaying observed in March, indicating that this species may be a resident to the area. Individual sparrowhawks were also observed on several occasions at Drinagh Bog throughout the winter.
- **2015/16 Winter Season:** Sparrowhawk were recorded on four dates between September and March at Clongawny Bog during the winter season surveys, including a pair seen over conifer woodland on the 24<sup>th</sup> of February 2016. Sparrowhawk were recorded twice at Drinagh Bog during the winter season surveys, including an observation of a pair seen soaring over the site on 24<sup>th</sup> of March.
- **2016 Breeding Season:** Sparrowhawk were recorded on two dates during the 2016 breeding season surveys at Clongawny Bog. A pair were seen circling over the site on the 16<sup>th</sup> of April, while a pair with one fledged chick were seen on the 17<sup>th</sup> of June 2016, indicating that sparrowhawk successfully bred on site. In addition, there was at least one breeding pair of sparrowhawk at Drinagh Bog during the 2016 breeding season. A pair were seen circling and displaying over the site in April and July.
- **2016/17 Winter Season:** Sparrowhawk were recorded on four dates during the winter season surveys at Clongawny Bog, including a displaying pair on the 18<sup>th</sup> of February 2017. Sparrowhawk were recorded on nine dates during the winter season surveys at Drinagh Bog, including observations of a pair on the 11<sup>th</sup> of February and a group of three on the 14<sup>th</sup> of March.
- **2017 Breeding Season:** Two pairs of breeding sparrowhawk were regularly recorded at Clongawny Bog during the 2016 breeding season surveys, with young birds seen and heard. There was also evidence of a further two pairs of breeding sparrowhawk at Drinagh Bog, with birds recorded regularly throughout the breeding season, including observations of pairs.

## 7.4.24 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 339 occasions during Vantage Point Surveys (see Figure 7.1.21, Appendix 7.4). Two-hundred and five of these observations occurred during the core breeding season months between April and August, while there were 134 observations of kestrel during non-breeding season months (September – March). Seventy-four observations occurred during the 2018 breeding season, while the remaining 131 observations occurred during the 2019 breeding season (April - August).

Thirty observations occurred during the 2017/18 non-breeding season (October – March) while 86 observations occurred during the 2018/19 non-breeding season, between September 2018 and March 2019. In addition, there were 18 observations of kestrel in flight during VP surveys in September 2019.

A large amount of flight activity occurred over the Drinagh wetlands, more than 500m east of the proposed turbine locations. The remaining flight activity occurred predominantly within, or partially within 500m of the proposed turbines. Eighty-two of the 339 flights occurred within, or partially within, the Potential Collision Height (PCH), while the remaining 257 observations occurred below the potential lowest rotor swept height.

In addition to the 339 observations of birds in flight, there were eight observations (seen or heard) of non-flying birds during non-breeding season months. Seven of the eight observations consisted of birds perched on trees, telephone poles, etc. The remaining observation consisted of birds heard calling from off-site to the east but not seen during a survey at VP7 on the 10<sup>th</sup> of January 2018.

### Breeding Bird Surveys

Kestrel were recorded on 23 occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.17). There were ten observations from the 2018 breeding season while there were thirteen observations of kestrel during 2019 Breeding Bird Surveys.

All ten observations from the 2018 Breeding Bird Surveys consisted of individual birds recorded hunting or flying between April and mid-May. On the 9<sup>th</sup> of July 2019 a kestrel was recorded making a kill and carrying food on the very northern edge of the site, between Drinagh wetlands and Noggus bog. This activity confirmed breeding locally with a nest site likely nearby. On the 15<sup>th</sup> of July 2019 two adult kestrel were recorded with three recently fledged chicks near an area of cutover bog and scrub within the proposed development site. The location of both 2019 breeding territories are provided in Figure 7.3.17.1, Appendix 7.4).

### Breeding Raptor Surveys

Kestrel were recorded on 23 occasions during Breeding Raptor Surveys (see Appendix 7.4, Figure 7.4.4). Fifteen observations occurred during the 2018 breeding season, while the remaining eight observations occurred during the 2019 breeding season (April – July). Observations predominantly occurred off-site, in two distinct areas. The majority of flight activity occurred either near an area of forestry directly south of the development site, or to the northeast near an area of grassland between Banagher and the development site.

On the 5<sup>th</sup> of April 2018 a pair of male kestrels were recorded hunting together. Each of the remaining 22 observations consisted of individual birds in hunting or commuting flights. No evidence of breeding activity was recorded during Breeding Raptor Surveys in either 2018 or 2019.

### Winter Transect/Waterfowl Surveys

Kestrel were recorded on twelve occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.19). Observations occurred between October 2018 and March 2019, as individual birds were observed in hunting/travelling flights. Observations of this species occurred predominantly within the development site and within 500m of the proposed turbine locations.

In addition, there was one observation of a kestrel recorded during winter transect surveys from the 2017/18 winter season. The observations occurred in March 2018 near the Clongawny area in the western section of the development site.

### Incidental Observations

There were 18 incidental observations of kestrel between October 2017 and September 2019. Fifteen of the 18 observations occurred during Migratory Bird Surveys along the Shannon and Little Brosna river, several kilometres to the west and south of the development site respectively. Ten of these observations occurred in January 2019, while the remaining five observations occurred during the 2019 breeding season, between April and September.

The remaining three observations were recorded during Hen Harrier Roost Surveys from winter months, consisting of individual birds in hunting flights within two kilometres of the development site. The remaining three observations occurred during Migratory Bird Surveys along the Shannon, several kilometres to the west of the development site.

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Kestrel were regularly recorded during all winter months at Clongawny Bog, including an observation of a pair seen together on the 11<sup>th</sup> of December. Individual kestrels were also regularly observed on during each month at Drinagh Bog throughout the winter, including observations of both male and female.
- **2015/16 Winter Season:** Kestrel were regularly recorded during all winter months at Clongawny Bog, including an observation of a pair seen together on the 23<sup>rd</sup> of October 2015. Kestrel were recorded on site in all months between December 2015 and March 2016. Most records were of individual birds, while a pair was recorded on the 10<sup>th</sup> of February 2016.
- **2016 Breeding Season:** Kestrel were recorded on three occasions during breeding season surveys at Clongawny Bog. Each observation was of individual birds in hunting flights between late August and September. Kestrel were recorded on four occasions during breeding season surveys at Drinagh Bog. Each observation was of individual birds in hunting flights between May and September.
- **2016/17 Winter Season:** Kestrel regularly recorded during all winter months at Clongawny Bog, with the exception of March 2017. Each observation was of individual birds in hunting flights. Kestrel was regularly recorded during all winter months at Drinagh Bog. All records were of individual birds, predominantly in hunting flights.
- **2017 Breeding Season:** Kestrel were recorded on six dates during breeding season surveys at Clongawny Bog. Each observation was of individual birds in hunting

flights. Kestrel were recorded on nine dates during breeding season surveys at Drinagh Bog. A pair were seen in flight together on the 4<sup>th</sup> of April, with all other observations of individuals in hunting flights.

## 7.4.25 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 in flight on 29 occasions during Vantage Point Surveys (see Figure 7.1.22, Appendix 7.4). Eighteen of these observations occurred during the core breeding season months between April and August, while there were eleven observations of snipe recorded during non-breeding season months (September – March). Twelve observations occurred during the 2018 breeding season, while the remaining six observations occurred during the 2019 breeding season (April - August).

Only one flight occurred during the 2017/18 non-breeding season (October – March) while ten observations occurred during the 2018/19 non-breeding season, between September 2018 and March 2019.

The majority of flight activity occurred over the Drinagh wetlands, more than 500m east of the proposed turbine locations. Nine observations occurred within, or partially within 500m of the proposed turbines. Ten of the 29 flights occurred within, or partially within, the Potential Collision Height (PCH), although four of these occurred more than 500m from the proposed turbines over the Drinagh wetlands and hence were not included in Collision Risk Modelling (CRM). The remaining 19 observations occurred below the potential lowest rotor swept height.

In addition to the 29 observations of birds in flight, there were thirteen observations of birds heard calling, chipping or drumming around dusk or dawn but not were seen.

### Breeding Bird Surveys

Snipe were recorded on 76 occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.18). There were 44 observations from the 2018 breeding season while there were 32 observations of snipe during 2019 Breeding Bird Surveys.

Thirty-seven observations related to birds calling, drumming, chipping or displaying or pairs recorded in areas of suitable breeding habitat. Several breeding territories were identified during both the 2018 and 2019 Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.18.1). In 2018, 18 breeding territories were recorded. Of these 13 were recorded within 400m of the turbines (Pearce-Higgins 2009), while four were recorded within the Drinagh wetlands to the east of the proposed turbines. The remaining breeding territory was to the south of the Cloneen wetlands. In 2019 ten breeding territories were recorded. Five of these were within 400m of the turbines (all in Clongawny/west of the briquette factory). The remaining four territories were recorded within the Drinagh wetlands to the east of the proposed turbines.

### Winter Transect/Waterfowl Surveys

Snipe were recorded on 139 occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.20). Observations occurred between October 2018 and May 2019. Observations of this species occurred predominantly within the development site during winter months, near Clongawny on

the western side of the development. Observations ranged from individual birds to a flock of eight snipe.

In addition, there were twenty observations of snipe during winter transect surveys from the 2017/18 winter season. Six observations occurred near the Clongawny area in the western section of the development site. Two observations occurred during a survey in November 2017, three observations occurred in January 2018, while the remaining observation occurred in March 2018.

The remaining 14 observations occurred near the Drinagh Wetlands in the east of the development site. Five observations occurred during a survey on the 11<sup>th</sup> of November 2017, while there were two observations from the 25<sup>th</sup> of January 2018 and seven observations from the 21<sup>st</sup> of March 2018.

### Incidental Observations

There were eleven incidental observations of snipe recorded between October 2017 and September 2019. Five of these observations were recorded during Hen Harrier Roost Surveys from winter months within two kilometres of the development site. Three observations occurred during Migratory Bird Surveys in January 2019 at the River Shannon and Little Brosna River, several kilometres to the west and south of the development site respectively. The remaining two observations of snipe occurred during Crane Dusk Surveys in March 2019, consisting of birds chipping around an area of cutover bog, close to VP4 at dusk.

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Snipe were regularly recorded during surveys at Clongawny Bog during winter months, with a total of 116 birds flushed during a walked transect on the 1<sup>st</sup> of December 2014. Snipe were also regularly recorded during surveys at Drinagh Bog, with most observations consisting of individuals and a peak count of seven birds recorded on the 27<sup>th</sup> of December.
- **2015/16 Winter Season:** Snipe were regularly recorded during surveys at Clongawny Bog during winter months, in small numbers (1-10 birds). A maximum of 38 birds was recorded during surveys on the 24<sup>th</sup> of November 2015. Snipe were also regularly recorded during surveys at Drinagh Bog, with most observations consisting of individuals and a peak count of fourteen flushed during a survey on the 20<sup>th</sup> of September 2015.
- **2016 Breeding Season:** Two snipe were recorded displaying during surveys in May 2016 at Clongawny Bog. There were a total of seven breeding snipe territories estimated at Drinagh Bog during the 2016 breeding season.
- **2016/17 Winter Season:** Snipe were recorded in small numbers (>10 birds) on all site visits, with a peak count of sixteen birds recorded on the 14<sup>th</sup> of November 2016. Snipe were also regularly recorded during surveys at Drinagh Bog, with most observations consisting of individuals or small flocks (>5 birds) and a peak count of 22 flushed during a survey on the 11<sup>th</sup> of February 2017.
- **2017 Breeding Season:** There were up to three territorial snipe recorded at Clongawny Bog, in areas of wet bog in April and May. There were a total of five breeding snipe territories estimated at Drinagh Bog during the 2017 breeding season.

## 7.4.26 Ringed Plover

Raw Survey data for ringed plover is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

## Vantage Point Surveys

Ringed plover were recorded in flight on seven occasions during Vantage Point Surveys (see Figure 7.1.23, Appendix 7.4). All seven observations occurred during May 2019. Observations of pairs, in suitable breeding habitat, alarm calling birds and birds seen in territorial defence of breeding territories. Twelve observations occurred during the 2018 breeding season, while the remaining six observations occurred during the 2019 breeding season (April - August). All flights occurred below the potential collision risk height.

In addition, there was also one observation of an individual bird seen perched on the ground near a flooded area of cutover bog, to the north of VP1 on the 2<sup>nd</sup> of August 2019. The location of all breeding territories identified during vantage point surveys can be found on Figure 7.1.23.1 in Appendix 7.4.

## Breeding Bird Surveys

Ringed plover were recorded on 19 occasions during Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.19). There were eight observations from the 2018 breeding season while there were eleven observations of ringed plover during 2019 Breeding Bird Surveys.

Fourteen of the 19 observations related to birds calling, displaying, incubating eggs or pairs recorded in areas of suitable breeding habitat. There were six breeding areas identified in total across both the 2018 and 2019 Breeding Bird Surveys (see Appendix 7.4, Figure 7.3.19.1). Only three of the six breeding areas were located with proximity of the development infrastructure (i.e. turbines and road networks) while there were two breeding territories at Derrybrat to the east of the proposed turbines and one breeding territory at Noggus to the north.

## Winter Transect/Waterfowl Surveys

Ringed plover were recorded on four occasions during Winter Transect/Waterfowl Surveys (see Appendix 7.4, Figure 7.7.21). Observations occurred between April 2019 and September 2019. All observations of this species occurred at Noggus bog to the north of the development site during the core breeding season.

Three of the four observations occurred between late April and May 2019, consisting of the known breeding pair at Noggus. The remaining observation occurred on the 3<sup>rd</sup> of September 2019 as an individual was seen foraging at Noggus around the known breeding territory.

## Incidental Observations

There was only one incidental observation of ringed plover recorded between October 2017 and September 2019. On the 7<sup>th</sup> of March 2019 a ringed plover was heard calling around dusk, but not seen during a Crane Dusk Survey.

## Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Ringed plover were recorded once during surveys at Clongawny Bog during winter months. On the 15<sup>th</sup> of March 2015 an individual was seen at a flooded area of cutover bog. Ringed plover were recorded twice during

surveys at Drinagh Bog during winter months, with at least one bird present in November and two birds present in late March.

- **2015/16 Winter Season:** Ringed plover were recorded once during surveys at Drinagh Bog during winter months. A single bird was recorded on the 21<sup>st</sup> of March 2016. This species was not recorded at Clongawny Bog.
- **2016 Breeding Season:** A pair of ringed plover were recorded at Clongawny Bog from mid-April onwards. These observations were noted as probable breeding. At least one pair of ringed plover bred at Drinagh Bog during the 2016 breeding season.
- **2017 Breeding Season:** A ringed plover was recorded at Clongawny Bog in April 2017 in an area of suitable breeding habitat. In addition, a single bird was seen perched on bog in September before being chased and killed by a merlin. A pair of ringed plover were recorded at Drinagh Bog in April 2016, but no evidence of breeding was observed.

#### 7.4.27 Teal

Raw Survey data for teal is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

##### Vantage Point Surveys

Teal were recorded in flight on three occasions during Vantage Point Surveys (see Figure 7.1.24, Appendix 7.4). All three flights occurred more than 500m from the proposed turbines locations around the Drinagh wetlands to the east of the proposed turbines. None of the flights occurred within the potential collision risk zone. One flight occurred during a survey at VP8 in December 2018, while the other two observations occurred during the core breeding season between May and July 2019.

In addition, there was also an observation of a flock of four teal seen feeding on a flooded area of cutover bog within the Drinagh wetlands on the 10<sup>th</sup> of January 2018.

##### Winter Transect/Waterfowl Surveys

Teal were recorded on 24 occasions during winter transect surveys from the 2017/18 winter season. Seven observations occurred around Clongawny to the west of the briquette factory, while there were 17 observations around the Drinagh Wetlands east of the proposed turbines. Six observations at Drinagh occurred during a survey on the 11<sup>th</sup> of November 2017 while there were eleven observations from the 25<sup>th</sup> of January 2018. At Clongawny, three observations occurred in November 2017 while there were four observations in January 2018.

There were no observations of teal during the MKO Winter Transect/Waterfowl surveys from the 2018/19 winter season.

##### Incidental Observations

There was only one incidental observation of teal recorded between October 2017 and September 2019. On the 12<sup>th</sup> of February 2019 a teal was heard calling around dusk, but not seen after a Vantage Point Survey at VP3.

##### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2014/15 Winter Season:** Teal were recorded on a regular basis at Clongawny Bog during the 2014/15 winter season, with observations mostly of small flocks (>10 birds) and with a peak count of c.65 birds on the 19<sup>th</sup> of December. Teal were regularly recorded at Drinagh Bog during winter surveys, with a peak count of 22 birds on the 23<sup>rd</sup> of January 2015.
- **2015/16 Winter Season:** Teal were recorded on five dates at Clongawny Bog, with observations mostly of small flocks and with a peak count of 28 birds on the 20<sup>th</sup> of October. Teal were only recorded on two dates in December at Drinagh Bog, with a flock of ten and a flock of 25 birds observed.
- **2016 Breeding Season:** A group of five teal were recorded on a flooded area at Clongawny Bog on the 21<sup>st</sup> of September 2016. A flock of twelve teal were flushed during a survey at Drinagh Bog on the 4<sup>th</sup> of September 2016.
- **2016/17 Winter Season:** Teal were recorded on five dates at Clongawny Bog, with observations mostly of small flocks and with a peak count of 28 birds on the 12<sup>th</sup> of November. Teal were recorded in small numbers throughout the winter at Drinagh Bog, with a maximum flock of c.60 birds recorded on the 8<sup>th</sup> of December 2016.
- **2017 Breeding Season:** Teal were recorded on three dates at Clongawny Bog between August and September, with observations consisting of small flocks (maximum of seven birds). A pair of teal were observed at Drinagh Bog in April 2017 but were not seen in subsequent visits.

## 7.4.28 Black-tailed Godwit

Raw Survey data for black-tailed godwit is provided in Appendix 7.4. Results summary tables are present in Appendix 7.3.

### Vantage Point Surveys

Black-tailed godwit were only recorded once during Vantage Point Surveys (see Figure 7.1.25, Appendix 7.4). On the 6<sup>th</sup> of August 2019 a flock of five black-tailed godwit were seen in flight travelling over the Drinagh wetlands to the east of the proposed turbines. The observation occurred more than 500m east of the proposed turbine locations and was outside any potential collision risk zone.

### Incidental Observations

There were six incidental observations of black-tailed godwit recorded between October 2017 and September 2019. All six observations occurred during Migratory Bird Surveys between March and September 2019. Flocks ranging from 140 to 350 birds were seen on five occasions during surveys at CMVP5 along the Shannon in March 2019. In addition, a flock of four birds were seen at the Shannon Callows during a survey at CMVP3 in September 2019.

### Additional Records (October 2014 – September 2017)

Field surveys were undertaken by Biosphere Environmental Services (BES) between October 2014 and September 2017 in the form of Vantage Point surveys and walked transects. Results and detailed survey summaries are provided in Appendix 7.7 and Appendix 7.5.

- **2015/16 Winter Season:** A single black-tailed godwit was recorded on migration at Drinagh Bog on the 21<sup>st</sup> of March 2016.

#### 7.4.29 **Passerines (Red Listed)**

The BoCCI Red listed species meadow pipit, grey wagtail and yellowhammer were all recorded during the surveys undertaken. None of these were regularly recorded within the development site with the majority of observations and breeding evidence occurring in areas of improved agricultural grassland adjacent to the development site.

## Evaluation

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

### Whooper Swan

#### Wintering

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

The Swan Census 2015 (Crowe et. al., 2015) was consulted regarding the population data for Whooper Swans in County Offaly. Based on the 2015 Swan Census data, in January 2015 the County Offaly population was 489 individuals. Based on the above, a population of 4-5 Whooper Swans is required for County Importance classification in the Offaly area.

Whooper swan is an SCI of both the Middle Shannon Callows SPA (004096) and the River Little Brosna Callows SPA (004086) with respect to wintering populations. Both SPAs are located within 5km of the development site, to the southwest. The core foraging range of whooper swan is 5km (SNH, 2016). The whooper population associated with the Middle Shannon Callows SPA is 407 birds, while the population associated within The River Little Brosna Callow SPA is 326 birds (IWeBS 5-year mean peak counts 2010/11 -2014/15). During the 2018/19 winter season, migratory bird surveys were undertaken which were specifically designed to determine if there was any connectivity between these SPAs and the proposed development site. No regular commuting/migratory flights were recorded that would constitute evidence of connectivity between the SPAs and the proposed development area. Furthermore, large numbers of whooper swan were recorded foraging and roosting within flooded sections of bog adjacent to the proposed development area. The evidence of surveys was that the local population was largely resident during the winter months in local areas of flooded bog.

During the 2017-2019 surveys, whooper swan flocks of county importance, as per NRA criteria (Crowe et al, 2015), were observed on 81 occasions. Flocks of National importance, as per NRA criteria (Burke et al, 2018), were observed on four occasions during vantage point surveys from the 2017/2018 winter season. All four of these observations occurred at the Drinagh wetlands, more than 500m east of the nearest proposed turbine. Five distinct roosting/foraging areas for whooper swan were recorded within one kilometre of the development site, although the majority of roosting and foraging activity occurred around the Drinagh wetlands to the east of the proposed turbines. The use of areas that overlap with development infrastructure was found to be secondary to the Drinagh wetlands where the majority of large flocks were recorded. Only two roosting/foraging areas were identified within proximity of the proposed turbines/development footprint with twelve swans being the maximum flock size observed in these areas. Large flocks c.200 birds were observed roosting at the Drinagh wetlands during the 2017/18 winter season, although numbers seen feeding and roosting in these areas in 2018/2019 were much lower with a maximum of 24 birds recorded here. Large whooper swan flocks were recorded at Noggus bog to the north of the Drinagh wetlands, away from the development site, during the 2018/2019 winter season.

While flocks of national importance were recorded on four occasions in 2017/18 this was the exception, with the vast majority of observations involving flocks of no greater than county importance. Therefore, the population recorded at the development site was assigned **County Importance**.

## Breeding

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

## 7.5.2 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 season was 270 birds. This maximum number does not correspond with the classification criteria for National or International Importance (Burke et al. 2018).

Golden plover is an SCI of both the Middle Shannon Callows SPA (004096) and the River Little Brosna Callows SPA (004086) with respect to wintering populations. Both SPAs are located within 5km to the development site, to the southwest. The golden plover population associated with the Middle Shannon Callows SPA is 5,915 birds, while the population associated within The River Little Brosna Callow SPA is 8,045 birds (I-WeBS 5-year mean peak counts 2010/11 -2014/15). As both SPAs are within the core foraging range of golden plover during winter months (Gillings and Fuller, 1999) the birds observed during surveys at the proposed development site have the potential to be associated with either or both SPAs. However, during the 2018/19 winter season, migratory bird surveys were undertaken which were specifically designed to determine if there was any connectivity between these SPAs and the proposed development site. No regular commuting/migratory flights were recorded that would constitute evidence of connectivity between the SPAs and the proposed development area.

To estimate the county population, a review of all County Offaly I-WeBS sites was conducted. 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 Offaly I-WeBS sites over the most recent 5-season period, i.e. for the period 2011/12 – 2015/16:

- Blackwater Railway Lake (mean = 0)
- Boora Lakes – Back Lakes Finnamores (mean = 1,925)
- Cloghanhill (mean = 12)
- \*Little Brosna Callows (mean = 5,845)
- \*Little Brosna Callows (aerial) (mean = 2,200)
- Raheen Lough (mean = 0)
- \*Shannon Callows (mean = 1,235)
- \*Shannon Callows (aerial) (mean = 4,680)
- Turraun Nature Reserve (mean = 1)

In the case of both the Shannon Callows and Little Brosna Callows, estimates are provided for both land counts and aerial counts. It is unclear whether aerial surveys only covered previously un-surveyed areas that were inaccessible from land counts or the entire site, which would therefore lead to a double count/overestimation. The bird populations for Little Brosna Callows and Shannon Callows utilised whichever peak count value was the highest (Aerial or Land Count) while disregarding the lower figure to avoid overestimating these populations. Based on the above, the mean wintering population from Offaly I-WeBS sites is 12,463.

Therefore, taking a precautionary approach, a regularly occurring population of 125 birds (1% of Offaly county population) is considered of County Importance in the context of the development site.

Flocks of 125 birds or more (County Importance) were recorded flying over the development site on six occasions, across five different survey dates, during the extensive suite of surveys undertaken. The population recorded at the development site was therefore assigned **County Importance** on the basis of a resident/regularly occurring wintering population assessed to be important to the county level.

### Breeding

Golden plover were observed in flight over the development site in April 2018 and April 2019. There were no further observations during the remainder of either the 2018 or 2019 breeding seasons. No evidence of breeding was recorded. Breeding golden plover are now restricted to the west and north west of the country, making the possibility of breeding activity in this area highly unlikely. Observations of this species in April of both years is likely to be associated with a lingering winter population.

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

## 7.5.3 Red-necked Phalarope

Red-necked phalarope is a rare summer visitor to Ireland between the months of May and October. Further detail regarding observations of this species and more detailed evaluation can be found in Confidential Appendix 7.5.

In acknowledgement of the rarity of the species in Ireland, the population recorded during surveys has been considered of **National Importance** on a precautionary basis.

## 7.5.4 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 20 occasions during winter months (September – March). Two separately used hen harrier wintering night roosts were identified. One of which was approximately 4km from the nearest proposed turbine, while the other occurred within the development site, approximately 500m from the nearest turbine. Hen harrier were only observed entering these roosts on one occasion in each instance and there were no observations of birds roosting at any other location within 2km of the development site throughout the 2018/19 winter season. There is a large communal hen harrier roost within the Lough Boora Parklands. The wintering hen harrier recorded within the proposed development are likely to be associated with this roost

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 infrequently recorded during the breeding season, i.e. hen harrier were recorded on eight occasions during the breeding season. All observations from the core breeding season consisted of ringtails (female or juvenile birds). No males were observed during this survey period. Four of these

observations were recorded in August, which is considered to be outside the core breeding season of April to July. No indication of breeding behaviour was observed either on site or within 2km of same.

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

### 7.5.5 Common Crane

Common crane were once a widespread and common resident bird species in Ireland but went extinct in this country towards the end of the 16<sup>th</sup> Century. There is a small breeding population of common crane in Norfolk as well as a re-introduction population in Somerset, England. However, this species is largely restricted to breeding grounds in eastern Europe and Asia, while their wintering grounds are predominantly located in France, Spain and North Africa. Common crane are currently a rare vagrant species recorded in Ireland predominantly during winter months.

Common crane were recorded in flight over the developments site on five occasions during the 2018/19 winter season, between December 2018 and March 2019, while regular roosting activity was not recorded within the development site. These observations are considered to be sightings of vagrant birds.

The development site is not of significance to the species.

### 7.5.6 Kingfisher

As reported (2008-2012) under Article 12 of the Birds Directive (Directive 2009/147/EC), the estimated national population of kingfisher is between 368 – 1,031 breeding pairs.

Kingfisher were only recorded on five occasions during surveys between October 2017 and September 2019 at the development site. All five observations occurred more than 2.5km east of the nearest proposed turbine over the Drinagh wetlands.

The development site is not of significance to the species.

### 7.5.7 Little Egret

Little egret have an estimated national wintering population of 1,274 birds based on the most recent I-WeBS 5-year mean peak counts (Burke et al. 2018). Therefore, 1% of the ROI National wintering population is c.13 birds. As per NRA 2009, a regularly occurring wintering population of 13 little egret is required for classification as Nationally/Internationally Importance. The maximum number of little egret recorded during a survey was five birds. This number does not correspond to numbers of National Importance.

Little egret were regularly recorded during both the breeding and wintering seasons during surveys at the development site. While this species was recorded during the breeding seasons, no evidence of breeding activity was recorded. The majority of observations occurred around the Drinagh wetlands, more than 500m to the east of the proposed turbine locations (Burke et al. 2018).

To estimate the county population, a review of all County Offaly IWeBS sites was conducted. It should be noted that little egret will utilise flooded fields/bogs, river banks and other habitats not typically surveyed during IWeBS counts. Therefore, the population estimate provided based on IWeBS figures below is likely to be an underestimate of the county population. The following mean count values have been recorded for Offaly I-WeBS sites over the most recent 5-season period, i.e. for the period 2011/12 – 2015/16:

- > Blackwater Railway Lake (mean = 0)
- > Boora Lakes – Back Lakes Finnamores (mean = 1)
- > Cloghanhill (mean = 0)
- > \*Little Brosna Callows (mean = 6)
- > \*Little Brosna Callows (aerial) (mean = 1)
- > Raheen Lough (mean = 1)
- > \*Shannon Callows (mean = 0)
- > \*Shannon Callows (aerial) (mean = 0)
- > Turraun Nature Reserve (mean = 2)

In the case of both the Shannon Callows and Little Brosna Callows, estimates are provided for both land counts and aerial counts. It is unclear whether aerial surveys only covered previously un-surveyed areas that were inaccessible from land counts or the entire site, which would therefore lead to a double count/overestimation. The bird populations for Little Brosna Callows and Shannon Callows utilised whichever peak count value was the highest (Aerial or Land Count) while disregarding the lower figure to avoid overestimating these populations. Based on the above, the mean wintering population from Offaly IWeBS sites is ten birds.

Therefore, taking a precautionary approach, a regularly occurring population of a single bird (1% of Offaly county population) is considered of County Importance in the context of the development site. The population recorded at the development site was therefore assigned **County Importance** on the basis of a resident/regularly occurring wintering population assessed to be important to the county level.

### 7.5.8 Marsh Harrier

Marsh harrier is a rare winter visitor to well-vegetated wetlands from March to September throughout Ireland, with observations consisting almost always of young non-breeding birds.

There were only two observations of marsh harrier during surveys between October 2017 and September 2019 at the development site. Both observations were of a juvenile bird recorded hunting over the Drinagh wetlands on the 25<sup>th</sup> of April 2019, more than 1.5km from the nearest proposed turbine.

The development site is not of ecological significance for this species.

### 7.5.9 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 four occasions during surveys between October 2017 and September 2019. All four observations were of individual birds recorded in flight during the 2017/18 winter season between December 2017 and March 2018. Three of the four observations occurred within, or partially within, 500m of the proposed turbine layout.

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

### 7.5.10 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 28 occasions during surveys between October 2017 and September 2019. Only nine of these observations occurred during the core breeding season for this species (April – August), while there was

no evidence of breeding activity either on site or within 2km of same, this species was regularly recorded foraging over the development site during winter months.

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.

## 7.5.11 Lapwing

### Wintering

The estimated national wintering population of lapwing in Ireland is 69,823 for the Republic of Ireland (ROI) (Burke et al. 2018). 1% of the ROI National wintering population of lapwing is 698 birds. As per NRA 2009, a regularly occurring population of 698 lapwing is required for classification as Nationally Important. The maximum number of birds recorded from the winter season was 400 birds. This maximum number does not correspond with the classification criteria for National or International Importance (Burke et al. 2018).

Lapwing is an SCI of both the Middle Shannon Callows SPA (004096) and the River Little Brosna Callows SPA (004086) with respect to wintering populations. Both SPAs are located within 5km to the development site, to the southwest. The lapwing population associated with the Middle Shannon Callows SPA is 5,988 birds, while the population associated within The River Little Brosna Callow SPA is 4,067 birds (IWeBS 5-year mean peak counts 2010/11 -2014/15). As both SPAs are within the core foraging range of lapwing during winter months (Gillings and Fuller, 1999) the birds observed during surveys at the proposed development site have the potential to be associated with either or both SPAs. However, during the 2018/19 winter season, migratory bird surveys were undertaken which were specifically designed to determine if there was any connectivity between these SPAs and the proposed development site. No regular commuting/migratory flights were recorded that would constitute evidence of connectivity between the SPAs and the proposed development area.

To estimate the county population, a review of all County Offaly I-WeBS sites was conducted. It should be noted that wintering lapwing 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 Offaly I-WeBS sites over the most recent 5-season period, i.e. for the period 2011/12 – 2015/16:

- Blackwater Railway Lake (mean = 0)
- Boora Lakes – Back Lakes Finnermore (mean = 1,138)
- Cloghanhill (mean = 24)
- \*Little Brosna Callows (mean = 3,092)
- \*Little Brosna Callows (aerial) (mean = 975)
- Raheen Lough (mean = 42)
- \*Shannon Callows (mean = 1,078)
- \*Shannon Callows (aerial) (mean = 4,910)
- Turraun Nature Reserve (mean = 6)

In the case of both the Shannon Callows and Little Brosna Callows, estimates are provided for both land counts and aerial counts. It is unclear whether aerial surveys only covered previously un-surveyed areas that were inaccessible from land counts or the entire site, which would therefore lead to a double count/overestimation. The bird populations for Little Brosna Callows and Shannon Callows utilised whichever peak count value was the highest (Aerial or Land Count) while disregarding the lower figure to avoid overestimating these populations. Based on the above, the mean wintering population from Offaly IWeBS sites is 9,212.

Therefore, taking a precautionary approach, a regularly occurring population of 92 birds (1% of Offaly county population) is considered of County Importance in the context of the development site. Flocks of County Importance were recorded flying over the site on six occasions between October 2017 and November 2018, during the extensive suite of VP surveys undertaken. Furthermore, flocks of county importance were observed on three occasions during Winter Transect/Waterfowl surveys in November 2018.

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

### Breeding

As reported (2008-2012) under Article 12 of the Birds Directive (Directive 2009/147/EC), the estimated population of breeding lapwing is 2,000 pairs based on Lauder & Donaghy (2008). Therefore, 1% of the National breeding population is 20 breeding pairs. As per NRA 2009, a regularly occurring population of 20 pairs of breeding lapwing is required for classification as Nationally Important.

During both the 2018 and 2019 breeding season the number of breeding lapwing recorded onsite or within 500m of the development site, was sixteen breeding pairs. In addition, there were a number of breeding pairs at Noggus bog and Derrybrat within proximity of the development site to the north and east of the Drinagh wetlands respectively. Therefore, taking a precautionary approach, the breeding lapwing population recorded during the breeding season are deemed to be of **National Importance**.

## 7.5.12 Black-headed Gull

### Breeding

As per the latest NPWS Article 12 reporting document, the estimated population of breeding black-headed gull is 9,318 pairs. Therefore, 1% of the National breeding population is 93 breeding pairs. As per NRA 2009, a regularly occurring population of 93 pairs of breeding black-headed gull is required for classification as Nationally Important.

The National Seabird 2000 survey data was consulted in order to determine numbers of breeding black-headed gull in the wider area, in the absence of more recently available data. All records of black-headed gull, both on-site and in the wider area, were recorded in June 2002. There were two separate black-headed gull colonies within the development site, consisting of 30 and 20 occupied nests. There were four observations of black-headed gull colonies between 5 – 10 kilometres from the development site. The census was completed with respect to number of occupied nests (i.e. breeding pairs). Taking a highly conservative approach it has been assumed that the number of birds was double the number of occupied nests, although it is likely that there were also non-breeding or juvenile birds in the area which were not accounted for. The total number of black-headed gull within the wider area has therefore been assumed as 126 birds (i.e. 63 occupied nests).

A breeding colony of approximately 300 black-headed gull have regularly established within the development site and surrounding areas in previous years. During the 2017 breeding season a colony of approximately 30 pairs of black-headed gulls held a breeding territory on a flooded area of cutover bog at Clooneen, northeast of VP1.

During the 2018 breeding season approximately 300 birds (i.e. potentially up to 150 pairs) were observed attempting to establish a breeding colony on a large area of flooded cutover bog within the development site and 500m of proposed turbines, just west of VP7, on the 2<sup>nd</sup> of May 2018. On a subsequent visit to the area, approximately one week later, the colony had abandoned this area, possibly due to the disturbances caused by peat extraction close to the breeding territory. There were also an additional five probable black-headed gull breeding territories onsite or within 500m of the

development site. There was one probable breeding pair in the Clooneen area, three probable breeding pairs west of the briquette factory and one probable breeding to the east of the briquette factory.

During the 2019 breeding season the breeding colony was established at Noggus Bog, to the north of the development site. Numbers within the colony ranged from approximately 120 to 150 birds (i.e. 60-75 breeding pairs), while there were also six breeding pairs of black-headed gull onsite or within 500m the development area. Two breeding pairs were recorded within the Clooneen area, three breeding pairs were recorded within an area of flooded bog just west of the briquette factory and VP4, while there was also one possible breeding pair within the Drinagh wetlands.

Numbers recorded to have successfully bred onsite were low, however, the population within the wider study area was considered of national importance. Therefore, taking a precautionary approach, the breeding black-headed gull population recorded during the breeding season are deemed to be of **National Importance**.

### Wintering

Black-headed gull were not regularly observed during surveys at the development site during winter months. Only thirteen observations occurred outside of the core breeding season months for this species. These observations are all likely to be associated with a lingering or an early establishing breeding population.

Wintering populations of this species are not dependent on the development site.

## 7.5.13 Herring Gull

Herring gull is Red listed during the breeding season only in Ireland (BoCCI). The species is not Red listed with regard to wintering populations.

Herring gull were only recorded on ten occasions during surveys between October 2017 and September 2019. Nine of the ten observations occurred between July and August 2018 as individuals to a maximum flock of five birds were recorded travelling over the development site, while the remaining observation occurred during November 2018. This species was not observed to utilise the development site or surrounding areas for foraging or breeding. Observations of this species were restricted to the end of the summer or winter months, given the timing of these observations these birds were considered to have been on passage through the area.

Numbers of ecological significance were not recorded. The development site is not significance for this species.

## 7.5.14 Woodcock

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

This species was regularly recorded during both the 2018 and 2019 breeding seasons at Derrinlough. Numerous roding male woodcock were recorded in displaying flights over five distinct areas. Three of these areas were within 500m of the proposed turbine locations, while the other two were east of the development infrastructure at the Drinagh wetlands and Derrybrat bog.

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

### 7.5.15 Curlew

Curlew is Red listed during both the breeding and wintering seasons in Ireland. The estimated national wintering population of curlew in Ireland is 28,300 for the Republic of Ireland (ROI) (Burke et al. 2018). 1% of the ROI National wintering population of curlew is 283 birds. As per NRA 2009, a regularly occurring population of 283 curlew is required for classification as Nationally Important. A population of national importance was not recorded within the proposed development area.

This species was only recorded occasionally during the winter months and between June and September 2019. The lack of observations of curlew earlier in the season (i.e. March to May inclusive), is a strong indication that these individuals were not associated with a breeding attempt on or near the site. Similarly surveying of the proposed development area prior to October 2017, did not record the site to be used by breeding curlew. On this basis, the birds recorded at the proposed development site are considered to be non-breeding individuals.

To estimate the county population, a review of all County Offaly I-WeBS sites was conducted. It should be noted that wintering curlew 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 Offaly I-WeBS sites over the most recent 5-season period, i.e. for the period 2011/12 – 2015/16:

- > Blackwater Railway Lake (mean = 0)
- > Boora Lakes – Back Lakes Finnamoses (mean = 142)
- > Cloghanhill (mean = 0)
- > \*Little Brosna Callows (mean = 5)
- > \*Little Brosna Callows (aerial) (mean = 0)
- > Raheen Lough (mean = 0)
- > \*Shannon Callows (mean = 10)
- > \*Shannon Callows (aerial) (mean = 2)
- > Turraun Nature Reserve (mean = 10)

In the case of both the Shannon Callows and Little Brosna Callows, estimates are provided for both land counts and aerial counts. It is unclear whether aerial surveys only covered previously un-surveyed areas that were inaccessible from land counts or the entire site, which would therefore lead to a double count/overestimation. The bird populations for Little Brosna Callows and Shannon Callows utilised whichever peak count value was the highest (Aerial or Land Count) while disregarding the lower figure to avoid overestimating these populations. Based on the above, the mean wintering population from Offaly I-WeBS sites is 167.

Therefore, taking a precautionary approach, a regularly occurring population of 1-2 birds (1% of Offaly county population) is considered of County Importance in the context of the development site.

Therefore, populations of County Importance (i.e. one bird) were seen or heard during surveys at the development site on eight occasions, across eight different survey dates, during the extensive suite of surveys undertaken. The population recorded at the development site was therefore assigned **County Importance** on a precautionary basis.

### 7.5.16 Dunlin

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

This species was only recorded twice during extensive surveys between October 2017 and September 2019. On the 25<sup>th</sup> of May 2018 an individual bird was seen circling low over southern corner of the flooded area just north of VP1 before travelling away from the development site in a south-westerly

direction. On the 23<sup>rd</sup> of May 2019 as a flock of four birds were seen foraging over an area of flooded cutover bog at Noggus to the northeast of the proposed development site.

No evidence of breeding activity was recorded during either the 2018 or 2019 season. Numbers of ecological significance were not recorded. The development site is not of significance to the species.

### 7.5.17 Redshank

#### Breeding

As per the latest NPWS Article 12 reporting document, the estimated population of breeding redshank is 500 pairs. Therefore, 1% of the National breeding population is 5 breeding pairs. As per NRA 2009, a regularly occurring population of 5 pairs of breeding redshank is required for classification as Nationally Important.

Redshank were recorded on 28 occasions onsite or within 500m of the development site, during extensive surveys between October 2017 and September 2019. Ten observations occurred during the 2018 breeding season while there were 17 observations from the 2019 breeding season. The remaining observation consisted of a single bird recorded foraging in September 2018. There were two confirmed breeding pairs in 2018, both of which were located within the Drinagh wetlands and in close proximity to one another. There were three confirmed breeding pairs in 2019. One breeding pair established in the same area of the Drinagh wetlands from 2018, while there was also a breeding pair at Derrybrat to the east of the development infrastructure and one breeding pair at Noggus to the north. These numbers do not correspond with the classification criteria for National Importance.

This species was not recorded during the winter season; therefore, the site is not of significance to a wintering population.

An estimate of the county population was not available. However, taking a precautionary approach the population recorded was assigned **County Importance** on the basis of a resident breeding population assessed to be important at the County level.

### 7.5.18 Shoveler

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

This species was only recorded on eight occasions during extensive surveys between October 2017 and September 2019. Six observations occurred between April and May 2019, while there were also two observations of this species during January 2019. There were three observations around the Drinagh wetlands, three observations at Noggus to the north of the development site and one observation at Derrybrat to the east of the development infrastructure. The remaining observation consisted of a flock of five birds recorded within the Clooneen wetland within the development site on the 9<sup>th</sup> of January 2019.

No evidence of breeding activity was recorded. Numbers of ecological significance were not recorded. The development site is not of significance to the species.

### 7.5.19 Tufted Duck

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

The estimated national wintering population of tufted duck in Ireland is 16,927 for the Republic of Ireland (ROI) (Burke et al. 2018). 1% of the ROI National wintering population of tufted duck is 169 birds. As per NRA 2009, a regularly occurring population of 169 tufted duck is required for classification as Nationally Important. The maximum number of birds recorded from the winter season was seven 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 Offaly IWeBS sites was conducted. The following mean count values have been recorded for Offaly I-WeBS sites over the most recent 5-season period, i.e. for the period 2011/12 – 2015/16:

- Blackwater Railway Lake (mean = 0)
- Boora Lakes – Back Lakes Finnamores (mean = 5)
- Cloghanhill (mean = 4)
- \*Little Brosna Callows (mean = 76)
- \*Little Brosna Callows (aerial) (mean = 0)
- Raheen Lough (mean = 14)
- \*Shannon Callows (mean = 2)
- \*Shannon Callows (aerial) (mean = 10)
- Turraun Nature Reserve (mean = 0)

In the case of both the Shannon Callows and Little Brosna Callows, estimates are provided for both land counts and aerial counts. It is unclear whether aerial surveys only covered previously un-surveyed areas that were inaccessible from land counts or the entire site, which would therefore lead to a double count/overestimation. The bird populations for Little Brosna Callows and Shannon Callows utilised whichever peak count value was the highest (Aerial or Land Count) while disregarding the lower figure to avoid overestimating these populations. Based on the above, the mean wintering population from Offaly IWeBS sites is 109 birds.

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

This species was regularly recorded during both the breeding and wintering season surveys between October 2017 and September 2019. Numbers recorded ranged from individuals to a flock of eight birds. Evidence of breeding was recorded at the Drinagh wetlands to the east of proposed turbines.

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

## 7.5.20 Wigeon

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

The estimated national wintering population of wigeon in Ireland is 50,452 for the Republic of Ireland (ROI) (Burke et al. 2018). 1% of the ROI National wintering population of wigeon is 505 birds. As per NRA 2009, a regularly occurring population of 505 wigeon is required for classification as Nationally Important. The maximum number of birds recorded from the winter season was 13 birds. This maximum number does not correspond with the classification criteria for National or International Importance (Burke et al. 2018).

Wigeon is an SCI of the Middle Shannon Callows SPA (004096) with respect to wintering populations. This SPA is located within the core foraging range of 2.5km for wintering wigeon (Johnson et al., 2014). The wigeon population associated with the Middle Shannon Callows SPA is 3,837 birds (IWeBS 5-year mean peak counts 2010/11 -2014/15). During the 2018/19 winter season, migratory bird surveys were

undertaken which were specifically designed to determine if there was any connectivity between these SPAs and the proposed development site. No regular commuting/migratory flights were recorded that would constitute evidence of connectivity between the SPAs and the proposed development area.

To estimate the county population, a review of all County Offaly IWeBS sites was conducted. The following mean count values have been recorded for Offaly I-WeBS sites over the most recent 5-season period, i.e. for the period 2011/12 – 2015/16:

- > Blackwater Railway Lake (mean = 0)
- > Boora Lakes – Back Lakes Finnamores (mean = 49)
- > Cloghanhill (mean = 225)
- > \*Little Brosna Callows (mean = 4,294)
- > \*Little Brosna Callows (aerial) (mean = 4,025)
- > Raheen Lough (mean = 62)
- > \*Shannon Callows (mean = 987)
- > \*Shannon Callows (aerial) (mean = 2,850)
- > Turraun Nature Reserve (mean = 0)

In the case of both the Shannon Callows and Little Brosna Callows, estimates are provided for both land counts and aerial counts. It is unclear whether aerial surveys only covered previously un-surveyed areas that were inaccessible from land counts or the entire site, which would therefore lead to a double count/overestimation. The bird populations for Little Brosna Callows and Shannon Callows utilised whichever peak count value was the highest (Aerial or Land Count) while disregarding the lower figure to avoid overestimating these populations. Based on the above, the mean wintering population from Offaly IWeBS sites is 7,480 birds.

Therefore, taking a precautionary approach, a regularly occurring population of 75 birds (1% of Offaly county population) is considered of County Importance in the context of the development site.

Wigeon were only recorded on ten occasions during extensive surveys between October 2017 and September 2019. Numbers recorded ranged from an individual duck to a flock of 35 birds, which does not correspond to numbers of County Importance. This species was only recorded on a single occasion within 500m of a proposed turbine. Nineteen birds were recorded on this occasion.

Numbers of ecological significance were not recorded. The development site is not of significance to the species. Populations recorded of each species were deemed to be of no greater than **Local Importance (Lower Value)**.

### 7.5.21 Long-eared Owl

Long-eared owl is not listed on Annex I of the Birds Directive. The species is Green listed in Ireland (BoCCI). This species was only recorded twice during extensive surveys between October 2017 and September 2019.

Numbers of ecological significance were not recorded. The development site is not of significance to the species.

### 7.5.22 Buzzard

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

### 7.5.23 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.

### 7.5.24 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.

### 7.5.25 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.

### 7.5.26 Ringed Plover

Ringed plover are green 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 breeding population assessed to be important at the local level.

### 7.5.27 Teal

Teal is not listed on Annex I of the Birds Directive. The species is Amber listed in Ireland (BoCCI) during both the breeding and wintering seasons. The species was infrequently recorded within proximity of the development site during the extensive two-year survey period. 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.

### 7.5.28 Black-tailed Godwit

Black-tailed Godwit is not listed on Annex I of the Birds Directive. The species is Amber listed in Ireland (BoCCI) during the wintering season only. The species was only recorded within close proximity of the development site on one occasion during the extensive two-year survey period. Numbers of ecological significance were not recorded. The development site is not of significance to the species.

### 7.5.29 Passerines (Red Listed)

Meadow pipit, grey wagtail and yellowhammer are Red listed in Ireland during the breeding season. Populations recorded of each species were deemed to be of no greater than **Local Importance (Lower Value)**.

## 7.6 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 |
|----------------------|---|--|---|------------|
| <b>Whooper Swan</b>  | Annex I, EU Birds Directive; SCI species of nearby SPAs                                       | <u>Wintering</u><br>County Importance                    | <p>This species was regularly recorded utilising habitats within the site boundary for foraging and roosting. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Birds were recorded flying over the development site and within 500m of the turbine layout. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p> | <b>Yes</b> |
| <b>Golden Plover</b> | Annex I, EU Birds Directive; SCI species of nearby SPAs; BoCCI Red List & Irish Wildlife Act. | <u>Wintering</u><br>Flocks of County Importance recorded | <p>This species was occasionally recorded loafing/roosting within the development site and within 500m of same during winter months. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Birds were recorded within the development site boundary. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p>            | <b>Yes</b> |

| Species                     | Conservation Status   | NRA Evaluation (NRA, 2009)  | Rationale for inclusion/exclusion as KOR   | KOR Yes/No |
|-----------------------------|---|---|--|------------|
| <b>Red-necked Phalarope</b> | Annex I, EU Birds Directive   | <b><u>Breeding</u></b><br>National Importance                         | <p>This species was recorded within the development site. The potential for direct habitat loss cannot be excluded. Taking a precautionary approach <b>an assessment of direct habitat loss is required.</b></p> <p>Birds were recorded within the development site boundary. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of this species, within the accuracy levels available to the assessment, is zero.</p>   | <b>Yes</b> |
| <b>Hen Harrier</b>          | Annex I, EU Birds Directive; BoCCI Amber List & Irish Wildlife Act. | <b><u>Wintering</u></b><br>National/International Importance recorded | <p>No evidence of breeding was recorded on or near the site. This species was only observed entering or leaving a winter roost site within the development site on one occasion, approximately 500m from the nearest proposed turbine. This species was occasionally recorded foraging within the development site. The potential for direct habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Birds were recorded within the development site boundary. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p> | <b>Yes</b> |

| Species             | Conservation Status                               | NRA Evaluation (NRA, 2009)   | Rationale for inclusion/exclusion as KOR   | KOR Yes/No |
|---------------------|---|--|--|------------|
| <b>Common Crane</b> | Annex I, EU Birds Directive                       | <u>NA</u>  | <p>Common crane are currently a rare vagrant species recorded in Ireland predominantly during winter months.</p> <p>These observations at the site are considered an anomaly that are highly unlikely to be repeated. As discussed in Section 7.5.5.</p>   | <b>No</b>  |
| <b>Kingfisher</b>   | Annex I, EU Birds Directive & Irish Wildlife Act. | <p><u>All Seasons</u></p> <p>No population of ecological significance recorded</p> | <p>This species was not recorded within 200m of the proposed turbines or development footprint with only two observations occurring within 500m of the proposed turbines (Please refer to section 7.5.6 for further details). There is no evidence to suggest that the development site is of significance to this species. There is no potential for direct habitat loss or displacement, given the separation distances involved.</p> <p>No flights were recorded within PCH during VP surveys. Therefore, there is no evidence that collision risk will be a significant impact for this species.</p> | <b>No</b>  |
| <b>Little Egret</b> | Annex I, EU Birds Directive & Irish Wildlife Act. | <p><u>All Seasons</u></p> <p>Flocks of County Importance recorded</p>              | <p>This species was occasionally recorded utilising habitats within the site boundary for foraging and roosting. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Birds were recorded flying over the development site and within 500m of the turbine layout. Taking a precautionary approach, <b>the potential for displacement exists.</b></p>   | <b>Yes</b> |

| 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. <b>A collision risk assessment is required.</b>   |            |
| <b>Marsh Harrier</b> | Annex I, EU Birds Directive   | No population of ecological significance recorded     | <p>This species was only recorded twice during the extensive two-year survey period, more than 1.5km from the nearest proposed turbine.</p> <p>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of this species, within the accuracy levels available to the assessment, is zero.</p>  | <b>No</b>  |
| <b>Merlin</b>        | Annex I, EU Birds Directive; BoCCI Amber List & Irish Wildlife Act. | <u>All Seasons</u><br>Local Importance (Higher Value) | <p>This species was only recorded on three occasions within 500m of the turbine layout during surveys between October 2017 and September 2019. This species was observed foraging/hunting within the development site on two occasions in February 2018. The potential for direct habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>This species was only on three occasions within 500m of the turbine layout during surveys between October 2017 and September 2019. Taking a precautionary approach, <b>an assessment of displacement effects is required.</b></p> <p>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of this species, within the accuracy levels available to the assessment, is zero.</p> | <b>Yes</b> |

| Species          | Conservation Status   | NRA Evaluation (NRA, 2009)  | Rationale for inclusion/exclusion as KOR   | KOR Yes/No |
|------------------|---|---|--|------------|
| <b>Peregrine</b> | Annex I, EU Birds Directive; BoCCI Green List & Irish Wildlife Act. | <b><u>All Seasons</u></b><br>Local Importance (Higher Value)      | <p>This species was occasionally recorded foraging within the development site. The potential for direct habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Birds were recorded within the development site boundary. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p>                                     | <b>Yes</b> |
| <b>Lapwing</b>   | BoCCI Red Listed (Breeding Populations) & Irish Wildlife Act.       | <b><u>Breeding</u></b><br>County Importance                       | <p>Several breeding lapwing pairs were recorded within the site boundary in both 2018 and 2019. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Several pairs of lapwing were recorded breeding within the development site and within 500m of onsite infrastructure. <b>The potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p> | <b>Yes</b> |
| <b>Lapwing</b>   | BoCCI Red Listed (Winter Populations) & Irish Wildlife Act.         | <b><u>Wintering</u></b><br>Flocks of National Importance recorded | <p>This species was occasionally recorded utilising habitats within the site boundary for foraging and roosting. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p>   | <b>Yes</b> |

| Species                  | Conservation Status   | NRA Evaluation (NRA, 2009)  | Rationale for inclusion/exclusion as KOR  | KOR Yes/No |
|--------------------------|---|---|---|------------|
|                          |   |   | <p>Birds were recorded within the development site and within 500m of the turbine layout. <b>The potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p>   |            |
| <b>Black-headed Gull</b> | BoCCI Red Listed (Breeding Populations) & Irish Wildlife Act. | <b><u>Breeding</u></b><br><br>Flocks of National Importance recorded            | <p>Black-headed gull bred within the site boundary in both 2018 and 2019. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>This species was recorded breeding within the development site and within 500m of development infrastructure. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p> | <b>Yes</b> |
| <b>Herring Gull</b>      | BoCCI Red Listed (Breeding Populations) & Irish Wildlife Act. | <b><u>Breeding</u></b><br><br>No population of ecological significance recorded | <p>Herring gull were recorded infrequently and in low numbers. There is no evidence to suggest that the development site is of significance to this species. Please refer to Section 7.5.13 for further detailed discussion.</p> <p>No pathways for significant effects were identified.</p>  | <b>No</b>  |
| <b>Woodcock</b>          | BoCCI Red Listed (Breeding                                    | <b><u>Breeding</u></b>  | There was a minimum of four distinct breeding territories identified within the proposed development site. The potential  | <b>Yes</b> |

| Species       | Conservation Status  | NRA Evaluation (NRA, 2009)  | Rationale for inclusion/exclusion as KOR  | KOR Yes/No |
|---------------|--|---|---|------------|
|               | Populations) & Irish Wildlife Act.                           | Local Importance (Higher Value)   | <p>for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Birds were recorded within the development site boundary and within 500m of the proposed turbine layout. <b>The potential for displacement exists.</b></p> <p>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of this species, within the accuracy levels available to the assessment, is zero.</p>  |            |
| <b>Curlew</b> | BoCCI Red List (breeding and wintering) & Irish Wildlife Act | <p><b><u>All Seasons</u></b></p> <p>No population of ecological significance recorded</p> | <p>This species was occasionally recorded utilising habitats within the site boundary for foraging. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Birds were recorded flying over the development site and within 500m of the turbine layout. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p> | <b>Yes</b> |
| <b>Dunlin</b> | BoCCI Red List (breeding and wintering)                      | <p><b><u>Breeding</u></b></p> <p>No population of ecological significance recorded</p>    | <p>This species was only recorded twice during extensive surveys between October 2017 and September 2019. The only observation of the species onsite involved an individual bird that was recorded circling a section of flooded bog. Numbers of</p>  | <b>No</b>  |

| Species         | Conservation Status   | NRA Evaluation (NRA, 2009)   | Rationale for inclusion/exclusion as KOR  | KOR Yes/No |
|-----------------|---|--|---|------------|
|                 |   |  | <p>ecological significance were not recorded. Please refer to Section 7.5.16 for further detailed discussion.</p> <p>No pathways for significant effects were identified.</p>   |            |
| <b>Redshank</b> | BoCCI Red List (breeding and wintering) & Irish Wildlife Act  | <b><u>Breeding</u></b><br>County Importance                                    | <p>Several breeding redshank pairs were recorded within the site boundary in both 2018 and 2019. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Several pairs of redshank were recorded breeding within the development site. <b>The potential for displacement exists.</b></p> <p>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of this species, within the accuracy levels available to the assessment, is zero.</p> | <b>Yes</b> |
| <b>Shoveler</b> | BoCCI Red Listed (Wintering Populations) & Irish Wildlife Act | <b><u>All Seasons</u></b><br>No population of ecological significance recorded | <p>Shoveler were not recorded within 500m of the proposed turbine locations. There is no potential for direct habitat loss or displacement to occur. Please refer to Section 7.5.18 for further detailed discussion.</p> <p>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of this species, within the accuracy levels available to the assessment, is zero.</p>  | <b>No</b>  |

| Species               | Conservation Status   | NRA Evaluation (NRA, 2009)  | Rationale for inclusion/exclusion as KOR   | KOR Yes/No |
|-----------------------|---|---|--|------------|
| <b>Tufted Duck</b>    | BoCCI Red Listed (Wintering Populations) & Irish Wildlife Act | <u>All Seasons</u><br>County Importance                               | <p>This species was only recorded on one occasion within 500m of the proposed turbine layout. There is no potential for direct habitat loss or displacement to occur.</p> <p>No flights were recorded within PCH during VP surveys. Therefore, there is no evidence that collision risk will be a significant impact for this species.</p> <p>No pathways for significant effects were identified.</p>   | <b>No</b>  |
| <b>Wigeon</b>         | BoCCI Red Listed (Wintering Populations) & Irish Wildlife Act | <u>Wintering</u><br>No population of ecological significance recorded | <p>The vast majority of observations occurred either within Noggus bog to the north of the site, or the Drinagh wetlands to the east of the proposed turbines. Wigeon were not recorded within 500m of the proposed turbine locations. There is no potential for direct habitat loss or displacement to occur. Please refer to Section 7.5.20 for further detailed discussion.</p> <p>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of this species, within the accuracy levels available to the assessment, is zero.</p> | <b>No</b>  |
| <b>Long-eared Owl</b> | Irish Wildlife Act  | <u>All Seasons</u><br>Local Importance (Higher Value)                 | <p>The favourable conservation status of this species (Green Listed BoCCI) limits the potential ecologically significant impacts to result from the proposed development. This species was recorded infrequently in low numbers. Please refer to Section 7.5.21 for further detailed discussion.</p> <p>Significant impacts are not predicted.</p>   | <b>No</b>  |

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

| Species              | Conservation Status                    | NRA Evaluation (NRA, 2009)   | Rationale for inclusion/exclusion as KOR  | KOR Yes/No |
|----------------------|--|--|---|------------|
| <b>Snipe</b>         | BoCCI Amber List & Irish Wildlife Act. | <b><u>All Seasons</u></b><br>Local Importance (Higher Value)                   | The potential for habitat loss, cannot be excluded. <b>An assessment of direct habitat loss is required.</b><br><br>The species was recorded within the site boundary. <b>An assessment of displacement effect is required.</b><br><br>This species was recorded flying over the site within the potential collision risk zone. <b>A collision risk assessment is required.</b>   | <b>Yes</b> |
| <b>Ringed Plover</b> | BoCCI Green List & Irish Wildlife Act. | <b><u>Breeding</u></b><br>Local Importance (Higher Value)                      | The potential for habitat loss, cannot be excluded. <b>An assessment of direct habitat loss is required.</b><br><br>The species was recorded within the site boundary. <b>An assessment of displacement effect is required.</b><br><br>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of this species, within the accuracy levels available to the assessment, is zero. | <b>Yes</b> |
| <b>Teal</b>          | BoCCI Amber List.                      | <b><u>All Seasons</u></b><br>No population of ecological significance recorded | The potential for habitat loss, cannot be excluded. <b>An assessment of direct habitat loss is required.</b><br><br>The species was recorded within the site boundary. <b>An assessment of displacement effect is required.</b><br><br>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of  | <b>Yes</b> |

| Species                        | Conservation Status                 | NRA Evaluation (NRA, 2009)  | Rationale for inclusion/exclusion as KOR   | KOR Yes/No |
|--------------------------------|-------------------------------------|---|--|------------|
|                                |                                     |   | this species, within the accuracy levels available to the assessment, is zero.   |            |
| <b>Black-tailed Godwit</b>     | BoCCI Amber List.                   | <u>All Seasons</u><br><br>No population of ecological significance recorded | This species was only recorded on one occasion during the extensive two-year survey period, consisting of a small flock in flight over the Drinagh wetlands to the east of the development infrastructure. There is no potential for direct habitat loss or displacement to occur.<br><br>No flights were recorded during VP surveys. Collision risk modelling therefore cannot be carried out. The collision risk of this species, within the accuracy levels available to the assessment, is zero. | <b>No</b>  |
| <b>Passerines (Red Listed)</b> | BoCCI Red List & Irish Wildlife Act | <u>All Seasons</u><br><br>Local Importance (Lower Value)                    | As per SNH guidance, it is considered that passerine species are not significantly impacted by wind farms.<br><br>Significant impacts are not predicted.   | <b>No</b>  |

## 7.7 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 Derrinlough were classified as Very High Sensitivity.

**High Sensitivity** KORs include:

- Whooper Swan (A flock of national importance was recorded)<sup>1</sup>
- Lapwing (Breeding Populations) (>1% Irish breeding population)
- Black-headed Gull (Breeding Populations) (>1% Irish breeding population)
- Hen Harrier (Ecologically Sensitive Species)
- Red-necked Phalarope (Ecologically Sensitive Species)

**Medium Sensitivity** KORs include:

- Golden Plover (Winter Populations) (Annex I; EU Birds Directive)
- Lapwing (Winter Populations) (BoCCI; Red Listed)
- Little Egret (Annex I; EU Birds Directive)
- Merlin (Annex I; EU Birds Directive)
- Peregrine (Annex I; EU Birds Directive)
- Woodcock (BoCCI; Red Listed)
- Redshank (BoCCI; Red Listed)

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

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

## 7.8 Likely and Significant Effects

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

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

All elements of the Proposed 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.

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<sup>1</sup> Flocks of National importance were observed on four occasions during vantage point surveys from the 2017/2018 winter season. Whilst these flock were considered the exception and were not regularly occurring Percival criteria does not differentiate between regularly occurring and not regularly occurring. Therefore, on a precautionary basis whooper swan have been classed as a high sensitivity species as per Percival (2003).

- > Machinery access to the turbine locations.
- > Excavation of turbine base foundations.
- > Erection of turbines.
- > Laying of internal and grid connection cables.
- > Construction of other site infrastructure including substations and control buildings, amenity links, public carpark, met masts and temporary construction compounds.
- > Operational Maintenance.
- > Decommissioning works and turbine removal.

### 7.8.1 **Do-Nothing Effect**

If the proposed development were not to proceed, the site would continue to be managed under the requirements of the relevant IPC licence, and existing commercial forestry, telecommunications and wind measurement would continue. The rail lines that supply peat to Derrinlough Briquette Factory would continue to be used until the manufacture of peat briquettes ceases.

The avian communities on the site would likely remain similar to its current state as activity levels and land use would not change significantly.

When the peat extraction activity ceases, a Rehabilitation Plan will be implemented in accordance with the IPC licence requirements, to environmentally stabilise the site through encouragement of re-vegetation of bare peat areas, with targeted active management being used to enhance re-vegetation and the creation of small wetland areas (if required).

The Rehabilitation Plan is designed to result in an overall increase in biodiversity on the site (i.e. including birds) when compared to the existing situation, following cessation of peat extraction.

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

### 7.8.2.1 Whooper Swan (Wintering)

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

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
| <b>Construction Phase</b>  |  |   |   |
| <b>Direct Habitat Loss</b>   | <p>Surveys conducted to inform the design layout and this impact assessment have identified that the majority of activity and greatest concentrations of swans (max. site count 227) were centred on the Drinagh wetlands. The turbine layout avoids the Drinagh wetlands with the closest turbine located c.900m to the west of the wetlands. The proposed amenity pathway is the only element of the project located in proximity to wetland habitat within Drinagh. The pathway follows an existing track at this location and no habitat loss is predicted.</p> <p>During the winter of 2018/19, small numbers of birds (Max 19 recorded on one occasion) were occasionally recorded roosting/foraging at three locations which overlap with the development footprint (see Figure 7.7.1.1 in Appendix 7.4). Whooper Swan are opportunistic, and studies have shown that the species may not remain loyal to specific habitat areas (Boland &amp; Crowe 2012; Boland et al. 2010).</p> <p>Due to the nature of the species, the sympathetic design of the development and the proposed retention and preservation of key habitat areas for the species in the wider area no significant effects are predicted in relation to direct habitat loss.</p> <p>Significant effects with regard to direct habitat loss are not predicted.</p> | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>High</i> Sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance.</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|---|---|---|
|  | In addition, enhancement measures are proposed for the Drinagh wetlands are predicted to be beneficial for this species. Please see Section 7.11 for further details.   |   |   |
| <b>Displacement</b>  | <p>The largest flocks of whooper swan were recorded during the 2017/18 winter season (max. site count 227). These flocks were concentrated in the Drinagh wetlands. A similar pattern of occurrence was recorded during the subsequent winter season (2018/19). The turbine layout avoids the Drinagh wetlands with the closest turbine located c.900m to the west of the wetlands. This exceeds the 600m zone of sensitivity for this species as identified in McGuinness et. al 2015.</p> <p>The proposed amenity pathway is the only element of the project located in proximity to wetland habitat within Drinagh. The pathway follows an existing track at this location and no significant displacement is predicted.</p> <p>During the winter of 2018/19, small numbers of birds (Max 19 recorded on one occasion) were occasionally recorded roosting/foraging at three locations which overlap with the development footprint (see Figure 7.7.1.1 in Appendix 7.4). Whooper Swan are an opportunistic species and studies have shown that species may not remain loyal to specific areas of suitable habitat (Boland &amp; Crowe 2012; Boland et al. 2010).</p> <p>Any potential construction related displacement will be temporary and insignificant. This is due to the nature of the species, the sympathetic design of the development and the proposed retention, and preservation of key habitat areas for the species in the wider area.</p> | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>High</i> Sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance.</p> | <b>Short-term Slight Negative Effect</b>    |
| Operational Phase  |   |   |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>  | <b>No Effect</b>                            |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
| <b>Displacement &amp; Barrier Effect</b>   | <p>Literature has identified exclusion from habitat around wind turbines as a displacement effect which can impact the availability of supporting habitat for whooper swan (Larsen &amp; Clausen 2002). In some cases, disturbance distances of up to 300 m from wind energy installations have been cited (Percival 2003). Observations of swan non-breeding activity (i.e. consistent with the current project) from eight European studies have given a mean minimum disturbance distance of 150 m from the base of wind turbines (Hötter et al. 2006).</p> <p>The largest flocks recorded at the proposed development site were recorded during the 2017/18 winter season (max. site count 227). These flocks were concentrated in the Drinagh wetlands. A similar pattern of occurrence was recorded during the subsequent winter season surveyed (2018/19). The turbine layout avoids the Drinagh wetlands with the closest turbine located c.900m to the west of the wetlands. This exceeds the 600m zone of sensitivity for this species as identified in McGuinness et. al 2016.</p> <p>Survey results, including migratory VPs, indicated that the development site does not lie on a migratory corridor for Whooper Swan. Therefore, no barrier effect is predicted.</p> <p>The proposed amenity pathway is the only element of the project located in proximity to wetland habitat within Drinagh. The pathway follows an existing track at this location and no significant displacement is predicted.</p> <p>During the winter of 2018/19, small numbers of birds (Max 19 recorded on one occasion) were occasionally recorded roosting/foraging at three locations which overlap with the development footprint (see Figure 7.7.1.1 in Appendix 7.4). Studies have shown that whooper swan have a reasonably broad habitat preference (Boland et al. 2010). In addition, the recently observed flux of sites indicates that this species may not remain loyal to specific areas of suitable habitat (Boland &amp; Crowe 2012; Boland et al. 2010). In addition, there are</p> | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>High Sensitivity</i> species and <i>Low Impact</i> corresponds to a <i>Low</i> effect significance.</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
|  | <p>extensive areas of suitable habitat in the wider area, outside any potential displacement buffer, should any potential displacement effect occur.</p> <p>Due to the nature of the species, the sympathetic design of the development and the proposed retention, preservation and enhancement of key habitat areas for the species in the wider area no significant displacement effects are predicted.</p>   |  |   |
| <b>Collision Mortality</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 0.21 collisions per year or one bird every 6.3 years. Annual mortality of adult whooper swan has been calculated at 20% per annum (Brazil, 2003). If 0.21 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 489) by 0.21%.</p> <p>The predicted collision risk is therefore negligible (&gt;1%) in the context of recorded population. No significant effects are anticipated regarding collision risk at any geographical scale.</p> | <p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>High Sensitivity</i> species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance.</p> | <b>Long-term Slight Negative Effect</b>     |

## 7.8.2.2 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 Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|---|---|---|
| <b>Construction Phase</b>  |   |   |   |
| <b>Direct Habitat Loss</b>   | <p>Birds were predominantly recorded flying over the development site</p> <p>This species was not regularly recorded utilising habitats within the proposed site boundary for roosting (2 occasions only). No evidence of foraging activity was recorded within the development footprint.</p> <p>Significant effects with regard to direct habitat loss are not anticipated.</p>   | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>Medium</i> Sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance.</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>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.</p> <p>This species was not regularly recorded utilising habitats within the site boundary for roosting or foraging. Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will be retained.</p> <p>Significant displacement effects are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>Medium</i> Sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance.</p> | <b>Short-term Slight Negative Effect</b>    |
| <b>Operational Phase</b>   |   |   |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>  | <b>No Effect</b>                            |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
| <b>Displacement</b>  | <p>A study by (Pearce-Higgins et al. 2009) found reduced use of habitat surrounding operating turbines, to within 200m of the turbine base. A review of 29 other studies suggests Golden Plover will approach wind turbines to an average distance of 175 m in non-breeding season (Hötker et al. 2006).</p> <p>Furthermore, post-construction monitoring at 15 upland wind farms showed no significant decline in populations post construction (Pearce-Higgins et al. 2012). There are extensive areas of suitable habitat in the wider area should any potential displacement effect occur.</p> <p>Significant displacement effects are not anticipated.</p>  | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>Medium</i> Sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance.</p>                   | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | <p>Collision risk for waders is generally deemed to be low, due to a relatively low cursory flight path, coupled with high flight manoeuvrability (McGuinness et al. 2015). A review of pan-European collision assessments revealed much lower Golden Plover collision records than other species, though this was not controlled for survey effort or corpse recovery rates (Hötker et al. 2006).</p> <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6. The collision risk assessment has followed a precautionary approach and utilises flight observations recorded across all seasons and includes flights several hundred meters from the proposed turbine layout. Therefore, the assessment provided below is highly conservative.</p> <p>The collision risk has been calculated at a rate of 14.9 collisions per year. Annual mortality of adult golden plover has been calculated at 27% per annum (Sandercock, 2003). If 14.9 collisions were to occur per year, it would mean</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <i>Very Low</i> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003) | Significance of potential effect (EPA 2017) |
|--|--|--|---|
|  | <p>that the losses at the proposed wind farm would increase the annual mortality for the county population (i.e. 12,463 birds (please see Section 7.5.2 for further details)) by 0.44%. The predicted collision risk is therefore negligible (&gt;1%) in the context of recorded population.</p> <p>No significant effects are anticipated regarding collision risk at any geographical scale.</p> |  |   |

### 7.8.2.3 Red-necked Phalarope (Breeding)

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

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017)                           |
|--|--|--|---|
| <b>Construction Phase</b>  |  |  |   |
| <b>Direct Habitat Loss</b>   | <p>To undertake an analysis of potential effect it was necessary to discuss information of a sensitive nature. This text has been redacted and is provided in confidential Appendix 7.5.</p> <p>In summary: significant effects are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>, as per Appendix 7.5.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Imperceptible Negative Effect</b> , as per Appendix 7.5. |
| <b>Displacement</b>  | <p>To undertake an analysis of potential effect it was necessary to discuss information of a sensitive nature. This text has been redacted and is provided in confidential Appendix 7.5.</p>   | <p>The magnitude of the effect is assessed as <i>negligible</i>, as per Appendix 7.5.</p>  | <b>Short term Slight Effect</b> , as per Appendix 7.5.                |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017)           |
|--|--|--|---|
|  | In summary: significant effects are not anticipated.   | The cross tabulation of a <i>High</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance  |   |
| Operational Phase  |  |  |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated   | <b>No Effect</b>   | <b>No Effect</b>                                      |
| <b>Displacement</b>  | <p>To undertake an analysis of potential effect it was necessary to discuss information of a sensitive nature. This text has been redacted and is provided in confidential Appendix 7.5.</p> <p>In summary: significant effects are not anticipated.</p>   | <p>The magnitude of the effect is assessed as <i>negligible</i>, as per Appendix 7.5.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Effect</b> , as per Appendix 7.5. |
| <b>Collision</b>   | This species was not recorded in flight during the extensive VP survey work undertaken. While collision risk modelling can therefore not be carried out, this does not mean that the collision risk cannot be assessed, but instead it means that the collision risk, within the accuracy levels available to the assessment, is zero. | <b>No Effect</b>   | <b>No Effect</b>                                      |

## 7.8.2.4 Hen Harrier (Wintering)

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

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
| <b>Construction Phase</b>  |  |  |   |
| <b>Direct Habitat Loss</b>   | <p>No breeding or (regular) roosting sites were recorded within the study area between October 2017 and September 2019. Two separately used hen harrier wintering night roosts were identified. One of which was approximately 4km from the nearest proposed turbine, while the other occurred within the development site, approximately 500m from the nearest turbine. Hen harrier were only observed entering these roosts on one occasion in each instance and there were no observations of birds roosting at any other location within 2km of the development site throughout the 2018/19 winter season.</p> <p>The majority of observations of this species consisted of individuals foraging over the Drinagh wetlands to the east of the proposed turbines during winter months. Occasional foraging activity was recorded within the development site and 500m of the proposed turbine locations.</p> <p>Significant effects are not anticipated particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>An assessment of the effects of a wind farm on an existing population of breeding hen harriers reported that, although reductions in flight activity around turbines were observed during the construction phase, the activity of</p>   | <p>The magnitude of the effect is assessed as <i>low</i>.</p>  | <b>Short-term Slight Negative Effect</b>    |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
|  | <p>bird populations quickly returned to pre-construction levels (Madden &amp; Porter 2007).</p> <p>Two, infrequently used, winter roost sites were identified, one within the development site and 500m from the proposed turbines, while the other was located at Derrybrat more than two kilometres to the east of the development infrastructure. The majority of foraging activity was recorded over the Drinagh wetlands to the east of the proposed turbines. Therefore, based on the core dataset there is no potential for significant displacement effects given that hen harrier were not dependent on the habitats located in close proximity to development infrastructure for foraging, roosting or breeding.</p>   | The cross tabulation of a <i>High</i> sensitivity species and <i>low</i> Impact corresponds to a <b>Low</b> effect significance  |   |
| Operational Phase  |  |  |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated   | <b>No Effect</b>   | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>Turbine avoidance has been observed in hen harrier at one wind farm installation to extend to within 250 m of turbines (Pearce-Higgins et al. 2009). This study predicted a 52% reduction in breeding population within 500 m of a wind energy array but found no significant modification in flight height near turbines.</p> <p>A possible, infrequently used, winter roost site was identified within the development site and 500m of the proposed turbine locations. However, a hen harrier was only recorded to use this roost on a single occasion.</p> <p>The species was not found to be dependent on habitat located in close proximity to development infrastructure for foraging at any time of the year, with the majority of foraging activity recorded over the Drinagh wetlands c.900m to the east from the nearest proposed turbine.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017)    |
|--|---|---|--|
|  | Significant displacement impacts are not predicted.   |   |  |
| <b>Collision</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 0.005 collisions per year, or one bird every 213 years. The predicted collision risk is insignificant in the context of the county, national and international population.</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Imperceptible Negative Effect</b> |

### 7.8.2.5 Little Egret (All Seasons)

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

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|---|--|---|
| <b>Construction Phase</b>  |   |  |   |
| <b>Direct Habitat Loss</b>   | <p>The majority of observations of this species consisted of individuals foraging, roosting/loafing and flying over the Drinagh wetlands during winter months. Little egret was not regularly recorded within 500m of the proposed turbine locations.</p> <p>Extensive areas of suitable foraging habitat will remain post construction and there is an abundance of suitable habitat in the wider area.</p> <p>Significant effects with regard to direct habitat loss are not predicted.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|---|---|---|
| <b>Displacement</b>  | <p>The majority of observations of this species consisted of individuals foraging, roosting/loafing and flying over the Drinagh wetlands during winter months.</p> <p>Significant effects are not anticipated particularly given the low levels of activity recorded. Extensive areas of suitable habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> <p>Significant displacement effects are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance</p>                  | <b>Short-term Slight Negative Effect</b>    |
| <b>Operational Phase</b>   |   |   |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>  | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>The majority of observations of this species consisted of individuals foraging, roosting/loafing and flying over the Drinagh wetlands during winter months.</p> <p>Significant effects are not anticipated particularly given the low levels of activity recorded. Extensive areas of suitable habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> <p>Significant displacement effects are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance</p>                  | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 0.02 collisions per year or one bird every 61 years. Annual mortality of adult little egret has been calculated at 28.8% per annum (Hafner et al., 1998). If 0.02 collisions were to</p>                       | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <i>Very Low</i> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003) | Significance of potential effect (EPA 2017) |
|--|--|--|---|
|  | occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the County population (i.e. 10 birds) by 0.69%. The predicted collision risk is therefore negligible in the context of County populations. The predicted collision risk is insignificant in the context of the county, national and international population. |  |   |

### 7.8.2.6 Merlin (*All Seasons*)

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

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
| <b>Construction Phase</b>  |  |   |   |
| <b>Direct Habitat Loss</b>   | <p>Merlin were only recorded on four occasions during surveys between October 2017 and September 2019. All four observations were of individual birds recorded in flight during the 2017/18 winter season between December 2017 and March 2018. Three of the four observations occurred within, or partially within, 500m of the proposed turbine layout. This species was not recorded utilising habitat within the site boundary for roosting or breeding. This species was only observed hunting within the development site twice, with both observations occurring in February 2018.</p> <p>Significant effects are not predicted particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
| <b>Displacement</b>  | <p>This species was not observed during either the 2018 or 2019 breeding seasons and no evidence of breeding activity was recorded within the study area. Observations were confined to the non-breeding period.</p> <p>Disturbance during construction is unlikely to discourage flight activity or foraging in the vicinity of the Proposed Development particularly given the low levels of activity recorded.</p> <p>Significant displacement effects are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Short-term Slight Negative Effect</b>    |
| Operational Phase  |  |   |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated   | <b>No Effect</b>  | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>Significant effects are not anticipated particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> <p>Significant displacement effects are not anticipated.</p>  | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | <p>This species was not recorded flying at the potential collision risk height during the extensive VP survey work undertaken. While collision risk modelling can therefore not be carried out, this does not mean that the collision risk cannot be assessed, but instead it means that the collision risk, within the accuracy levels available to the assessment, is zero.</p>  | <b>No Effect</b>  | <b>No Effect</b>                            |

### 7.8.2.7 Peregrine (All Seasons)

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

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|---|--|---|
| <b>Construction Phase</b>  |   |  |   |
| <b>Direct Habitat Loss</b>   | <p>Peregrine were regularly recorded foraging over the development site during winter months. While there were occasional observations of this species foraging within the development site during the breeding season, no evidence of breeding activity was recorded. Furthermore, there is no suitable breeding habitat for this species on site or in the surrounding areas. Significant effects are not anticipated particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>Foraging was most commonly observed during the winter months. While there were occasional observations of this species foraging within the development site during the breeding season, no evidence of breeding activity was recorded. Furthermore, there is no suitable breeding habitat for this species on site or in the surrounding areas.</p> <p>Disturbance during construction is unlikely to discourage flight activity or foraging in the vicinity of the Proposed Development particularly given the low levels of activity recorded.</p> <p>Significant displacement effects are not anticipated.</p>                  | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Short-term Slight Negative Effect</b>    |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
| Operational Phase  |  |   |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated   | <b>No Effect</b>  | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>Significant effects are not anticipated particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> <p>Furthermore, peregrine has been documented to become accustomed to various sources of human disturbance (Ruddock et. al 2007). It is therefore reasonable to conclude that following a period of habituation, the wintering population, which accounts for the majority of foraging within the development site will become accustomed to the wind farm in the landscape.</p>  | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p>                    | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 0.07 collisions per year or one bird every 14 years. Annual mortality of adult peregrine has been calculated at 20% per annum (Craig, 2004). If 0.07 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the National population (i.e. c.850 birds) by 0.04%. The predicted collision risk is therefore negligible in the context of the National peregrine population.</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

## 7.8.2.8 Lapwing

### 7.8.2.8.1 Breeding Population

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

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017)                                |
|--|---|--|--|
| <b>Construction Phase</b>  |   |  |  |
| <b>Direct Habitat Loss</b>   | <p>Lapwing breed on open grasslands and prefer nesting in fields that are relatively well grazed and/or flooded in winter, the nest consisting of a shallow scrape in this short grass (Snow &amp; Perrins 1998). However, in the absence of optimal habitat, the species will breed in cutover bog.</p> <p>During both the 2018 and 2019 breeding seasons the maximum number of breeding lapwing onsite or within 500m of the proposed development area, was 16 breeding pairs.</p> <p>There were seven breeding lapwing pairs which held territories in areas which overlap with the development footprint (see Figure 7.3.7.1 and Figure 7.3.7.2 in Appendix 7.4). However, the development footprint is restricted to a narrow corridor in these areas and the direct loss of habitat will be minimal. In addition, extensive areas of suitable foraging and nesting habitat will remain post construction.</p> <p>Significant effects with regard to habitat loss are not predicted.</p> <p>Although no significant habitat loss is predicted; a habitat enhancement plan has been devised with the aim of creating suitable foraging and breeding habitat for the species locally (See Section 7.11 below).</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <p><b>On a precautionary basis, Long-term Moderate Negative Effect</b></p> |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017)                          |
|--|--|--|--|
| <b>Displacement</b>  | <p>During both the 2018 and 2019 breeding seasons the maximum number of breeding lapwing onsite or within 500m of the proposed development area, was 16 breeding pairs.</p> <p>There were seven breeding lapwing pairs which held territories in areas which overlap with the development footprint (see (see Figure 7.3.7.1 and Figure 7.3.7.2 in Appendix 7.4). However, the development footprint is restricted to a narrow corridor in these areas and any potential disturbance/displacement during construction will be temporary in nature. In addition, extensive areas of suitable foraging and nesting habitat will remain in the wider area should any temporary and localised effect occur. Overall, significant displacement of breeding lapwing is not predicted</p> <p>Following construction works, it is expected that Lapwing will continue to establish breeding territories within the site.</p> <p>Although no significant displacement is predicted; a habitat enhancement plan has been devised with the aim of creating suitable foraging and breeding habitat for the species locally (See Section 7.11).</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>On a precautionary basis, Short-term Moderate Negative Effect</b> |
| <b>Operational Phase</b>   |  |  |  |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated   | <b>No Effect</b>   | <b>No Effect</b>   |
| <b>Displacement</b>  | Several studies of wind energy infrastructure and its impact on bird populations have found no discernible impact on populations of breeding Lapwings, either through collision, disturbance displacement or avoidance (Winkelman 1992; Ketzenberg et al. 2002; Pearce-Higgins et al. 2009).   | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>low</i></p>  | <b>On a precautionary basis, Long-term Moderate Negative Effect</b>  |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|---|---|---|
|  | <p>Hotker et al. (2006) undertook a meta-analysis of existing literature on disturbance distances. This review reported from the 13 studies examined the mean disturbance distance for breeding lapwing was 108m. Pearce-Higgins et al. (2009) found no significant relationship between distance to wind farms and changes on occurrence.</p> <p>There were seven breeding lapwing pairs which held territories in areas which overlap with the development footprint (see Figure 7.3.7.1 and Figure 7.3.7.2 in Appendix 7.4). However, the development footprint is restricted to a narrow corridor in these areas and extensive areas of suitable foraging and nesting habitat will remain post construction.</p> <p>The presence of the wind farm is not expected to deter Lapwing from breeding within the study during the operational phase of the wind farm development. Langston et al. (2003) found that Lapwing nesting occurred slightly closer to turbines possibly as a result of the creation of preferred areas of shorter vegetation.</p> <p>Overall, significant displacement of breeding lapwing is not predicted.</p> <p>Although no significant habitat loss is predicted; a habitat enhancement plan has been devised with the aim of creating suitable foraging and breeding habitat for the species locally (See section 7.11 below).</p> | <p>Impact corresponds to a <b>Low</b> effect significance</p>   |   |
| <b>Collision</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p>  | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>Negligible</i></p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003) | Significance of potential effect (EPA 2017) |
|--|---|--|---|
|  | The collision risk has been calculated at a ratio of 0.20 collisions per year or one bird every 5 years. Annual mortality of adult lapwing has been calculated at 29.5% per annum (Peach et al., 1994). If 0.20 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the local population (i.e. 228 birds) <sup>2</sup> by 0.3%. The predicted collision risk is therefore negligible in the context of the local breeding lapwing population. | Impact corresponds to a <b>Very Low</b> effect significance    |   |

### 7.8.2.8.2 Wintering Population

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

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
| <b>Construction Phase</b>  |  |   |   |
| <b>Direct Habitat Loss</b>   | Lapwing were observed on 78 occasions during non-breeding season months (September – March). The majority of flight activity from the winter seasons was of large flocks flying over the development site en-route to winter foraging habitat in nearby agricultural land. This species was occasionally observed roosting or foraging in close proximity of the development footprint during winter months, although the majority of observations were of large flocks commuting across the site. | The magnitude of the effect is assessed as <b>Low</b> .<br><br>The cross tabulation of a <b>Medium</b> Sensitivity species and <b>Low</b> Impact corresponds to a <b>Low</b> effect significance. | <b>Long-term Slight Negative Effect</b>     |

<sup>2</sup> Local population: Lough Boora Parklands contained 85 pairs in 2015 (Newton, 2015) plus the 29 pairs recorded within the study area equals 228 individuals.

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
|  | The species was not dependent on the site for foraging or roosting during the wintering period. Extensive areas of suitable foraging and roosting habitat will remain post construction and no significant impacts are predicted.  |   |   |
| <b>Displacement</b>  | <p>Wintering lapwing favour agricultural grassland for foraging during the winter months. The dominant habitat onsite is cutover bog this habitat is considered to provide sub-optimal foraging habitat for lapwing. This species was not observed to regularly utilise any areas of the development site during winter months but was primarily recorded travelling over the site. The surrounding agricultural land is considered to provided more favourable winter foraging habitat. The sections of the site where wintering lapwing were most frequently recorded were more than 500m from the proposed turbines within the Clooneen wetland and the northeast Drinagh wetland (see Appendix 7.4, Figure 7.1.10b and Figure 7.7.7).</p> <p>Disturbance during construction is unlikely to discourage flight activity in the vicinity of the proposed development.</p> <p>Significant displacement effects are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabature of a <i>Medium</i> Sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance.</p> | <b>Short-term Slight Negative Effect</b>    |
| Operational Phase  |  |   |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated   | <b>No Effect</b>  | <b>No Effect</b>                            |
| <b>Displacement</b>  | Hotker et al. (2006) undertook a meta-analysis of existing literature on disturbance distances. This review reported from the 32 studies examined the mean disturbance distance for wintering lapwing was 260m.  | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabature of a <i>Medium</i> Sensitivity species and</p>  | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|---|---|---|
|  | <p>This species was not observed to regularly utilise any areas of the development site during winter months but was primarily recorded travelling over the site. Flocks of County Importance were recorded flying over the site on four occasions between November and December 2017. This species was recorded in flight, foraging or roosting within 260m of the proposed turbines on 21 occasions, during winter months. The majority of flight activity occurred more than 500m from the proposed turbines and was associated with the Clooneen wetland and northeast Drinagh wetland.</p> <p>There are extensive areas of suitable habitat in the wider area, outside any potential displacement buffer, should any potential displacement effect occur.</p> <p>Significant displacement effects are not anticipated.</p> | <p><i>Low</i> Impact corresponds to a <b>Low</b> effect significance.</p>   |   |
| <b>Collision</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 3.55 collisions per year. Annual mortality of adult lapwing has been calculated at 29.5% per annum (Peach et al., 1994). If 3.55 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the County population (i.e. 9,212 birds) by 0.13%.</p> <p>The predicted collision risk is therefore negligible in the context of the county population. No significant effects are anticipated regarding collision risk at any geographical scale.</p>                                      | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

### 7.8.2.9 Black-headed Gull (Breeding)

Table 7-21 Impact Characterisation for Black-headed Gull based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
| <b>Construction Phase</b>  |  |  |   |
| <b>Direct Habitat Loss</b>   | <p>Within the wider study area, a population black-headed gull were found to opportunistically nest on islands within flooded sections of bog (outside the development site) No active breeding colony was recorded within the development site during the 2 years of comprehensive surveys undertaken to inform this assessment. During the 2018 breeding season, approximately 300 birds (i.e. potentially up to 150 pairs) were observed attempting to establish a breeding colony on a large area of flooded cutover bog within the development site. However, this colony did not establish at this location. They had relocated to Noggus bog in 2019.</p> <p>Between 2018 and 2019 only five-six probable breeding pairs of black-headed gull recorded onsite or within 500m the development area. Two breeding areas overlapped with the development footprint. The potential loss of breeding habitat will be minimal as the infrastructure, in the identified breeding areas, is confined to a narrow corridor. Significant areas of suitable nesting and foraging habitat will continue to remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> <p>Significant habitat loss effects are not predicted.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>No active breeding colony was recorded within the development site during the 2 years of comprehensive surveys undertaken to inform this assessment.</p>  | <p>The magnitude of the effect is assessed as <i>low</i>.</p>  | <b>Short-term Slight Negative Effect</b>    |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
|  | <p>Between 2018 and 2019 only five-six probable breeding pairs of black-headed gull recorded onsite or within 500m the development area. Two breeding areas overlapped with the development footprint.</p> <p>On a precautionary basis it is assumed that some temporary displacement may occur. However, given the extent of suitable habitat in the wider area; significant displacement during the construction phase is not anticipated. Furthermore, previous studies have shown increases in populations of this species around wind farm developments (Winkelman, 1989).</p> <p>Significant displacement effects are not anticipated.</p>   | <p>The cross tabulation of a <i>High</i> sensitivity species and <i>low</i> Impact corresponds to a <b>Low</b> effect significance</p>   |   |
| Operational Phase  |  |  |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated   | <b>No Effect</b>   | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>No active breeding colony was recorded within the development site during the 2 years of comprehensive surveys undertaken in compliance with SNH guidelines (SNH 2017) that form the core data set to inform this assessment.</p> <p>Between 2018 and 2019 only five-six probable breeding pairs of black-headed gull recorded onsite or within 500m the development area. Two breeding areas overlapped with the development footprint.</p> <p>Winkelman (1992), found no associated disturbance effect for black-headed gull due to the presence of operational windfarms. Furthermore, previous studies have shown increases in populations of this species around wind farm developments (Winkelman, 1989).</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|---|--|---|
|  | <p>Extensive areas of suitable habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area. There are extensive areas of suitable habitat in the wider area should any potential displacement effect occur.</p> <p>Significant displacement effects are not anticipated. In addition, enhancement measures are proposed for the Drinagh wetlands that are predicted to be beneficial for this species at the local level. Please see Section 7.11 for details.</p>  |  |   |
| <b>Collision</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 1.97 collisions per year. Annual mortality of adult black-headed gull has been calculated at 10% per annum (Prévoit-Julliard et al., 1998). If 1.97 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the National population (i.e. c.18,636 birds) by 0.11%. The predicted collision risk is therefore negligible in the context of the National breeding black-headed gull population. The number of individuals within proximity of the development site was estimated to be 300 birds, while it has been estimated that there are c.126 birds in the wider area using the National Seabird 2000 survey data (see Section 7.5.12 for more detail). If 1.97 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the local breeding population (i.e. c.426 birds) by 4.62%.</p> <p>The predicted collision risk is therefore <i>low</i> (i.e. 1-5% increase) in the context of the local breeding black-headed gull population.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

### 7.8.2.10 Woodcock (Breeding)

Table 7-22 Impact Characterisation for Woodcock based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
| <b>Construction Phase</b>  |  |  |   |
| <b>Direct Habitat Loss</b>   | <p>This species was regularly recorded during both the 2018 and 2019 breeding seasons at Derrinlough. Numerous roding male woodcock were recorded. These observations indicate that woodcock bred within the development site.</p> <p>Sections of the site are dominated by scrub and immature birch woodland which provide suitable breeding habitat for woodcock. Five distinct breeding areas were identified, three of which overlap with the development footprint (see Appendix 7.4, Figure 7.1.13.1). However, the dominant area of activity was at the at Drinagh and this area has been avoided by turbine infrastructure.</p> <p>Elsewhere, the development footprint is restricted to a narrow corridor and direct loss of habitat will be minimal. In addition, extensive areas of suitable foraging and nesting habitat will remain post construction.</p> <p>Considering the above, no significant habitat loss is predicted.</p> <p>In addition, enhancement measures are proposed for the Drinagh wetlands and additional native woodland planting are predicted to be beneficial for this species. Please see Section 7.11 for further details.</p> | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>This species was regularly recorded during both the 2018 and 2019 breeding seasons at Derrinlough. Numerous roding male woodcock were recorded. These observations indicate that woodcock bred within the development site.</p>   | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p>   | <b>Short-term Slight Negative Effect</b>    |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
|  | On a precautionary basis it is assumed that some temporary displacement may occur but given the extent of suitable habitat in the wider area and the crepuscular/nocturnal habitat of the species; significant displacement during the construction phase is not anticipated.  | The cross tabulation of <i>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Low</b> effect significance   |   |
| <b>Operational Phase</b>   |  |  |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated   | <b>No Effect</b>   | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>The species is not identified, in McGuinness et. al 2015, as particularly sensitive to wind energy developments.</p> <p>Sections of the site are dominated by scrub and immature birch woodland which provide suitable breeding habitat for woodcock. Five distinct breeding areas were identified, three of which overlap with the development footprint (see Appendix 7.4, Figure 7.1.13.1). However, the dominant area of activity was at the at Drinagh and this area has been avoided by turbine infrastructure.</p> <p>On a precautionary basis it is assumed that some initial displacement may occur but given the extent of suitable habitat in the wider area and the crepuscular/nocturnal habitat of the species; significant ongoing displacement during operation is not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | This species was not recorded flying at the potential collision risk height during the extensive VP survey work undertaken. While collision risk modelling can therefore not be carried out, this does not mean that the collision risk cannot be assessed, but instead it means that the collision risk, within the accuracy levels available to the assessment, is zero.   | <b>No Effect</b>   | <b>No Effect</b>                            |

### 7.8.2.11 Curlew (Non-Breeding)

Table 7-23 Impact Characterisation for Curlew based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|---|--|---|
| <b>Construction Phase</b>  |   |  |   |
| <b>Direct Habitat Loss</b>   | <p>This species was only recorded occasionally during the winter months and between June and September 2019. The lack of observations of curlew earlier in the season (i.e. March to May inclusive), is a strong indication that these individuals were not associated with a breeding attempt on or near the site. No breeding population was recorded during the comprehensive suite of surveys undertaken. This species did not regularly utilise any areas of habitat within the development site.</p> <p>Significant effects are not anticipated particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>This species was only recorded in close proximity of the proposed development footprint on a single occasion (see Appendix 7.4, Figure 7.3.11). The dominant habitat onsite is cutover bog this habitat is considered to provide sub-optimal foraging habitat for curlew.</p> <p>Significant displacement effects are not anticipated, given that the species is not dependent on the site, there are extensive areas of suitable habitat that will remain post construction and there is an abundance of suitable habitat in the wider area.</p>  | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p> | <b>Short-term Slight Negative Effect</b>    |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
| <b>Operational Phase</b>   |  |   |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated   | <b>No Effect</b>  | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>The few observations of this species occurred around the Drinagh wetlands to the east of the proposed turbines. This wetland is considered to provide more suitable habitat for foraging curlew than the cutover bog that dominates the rest of the site. This species was only recorded in close proximity of the proposed development footprint on a single occasion (see Appendix 7.4, Figure 7.3.11).</p> <p>Extensive areas of suitable habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area. Significant effects are not anticipated particularly given the low levels of activity recorded.</p>   | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p>                    | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 0.16 collisions per year. Annual mortality of adult curlew has been calculated at 26% per annum (Evans, 1984). If 0.16 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. c. 167 birds) by 0.37%. The predicted collision risk is therefore negligible in the context of the county population. No significant effects are anticipated regarding collision risk at any geographical scale.</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

## 7.8.2.12 Redshank (Breeding)

Table 7-24 Impact Characterisation for Redshank based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|---|---|---|
| <b>Construction Phase</b>  |   |   |   |
| <b>Direct Habitat Loss</b>   | <p>Breeding redshank were recorded during both the 2018 and 2019 breeding season. Two breeding pairs were recorded within the Drinagh wetlands in 2018 while there was one breeding pair in this area in 2019. Both breeding territories were approximately one kilometre from the nearest proposed turbine. This exceeds the 800m zone of sensitivity for the species (McGuinness et.al 2015). The proposed amenity trail is the only infrastructure located in proximity to Drinagh. The trail follows an existing track at this location and no habitat loss is predicted.</p> <p>Significant effects with regard to direct habitat loss are not anticipated as both breeding territories were approximately one kilometre from the nearest proposed turbine.</p> <p>In addition, enhancement measures are proposed for the Drinagh wetlands are predicted to be beneficial for this species. Please see Section 7.11 for further details.</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>This species was not recorded in close proximity of the development infrastructure and the location of both breeding territories were approximately one kilometre from the nearest proposed turbine. This exceeds the 800m zone of sensitivity for the species (McGuinness et.al 2015). The proposed amenity trail is the only infrastructure located in proximity to Drinagh. The trail follows an existing track at this location and no significant displacement is predicted.</p>  | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i></p>   | <b>Short-term Slight Negative Effect</b>    |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|---|---|---|
|  | Significant effects with regard to displacement and barrier effect are not anticipated, given the c. 1km separation distance involved.  | Impact corresponds to a <b>Very Low</b> effect significance   |   |
| Operational Phase  |   |   |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>  | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>This species was not recorded in close proximity of the development footprint and the location of both breeding territories were approximately one kilometre from the nearest proposed turbine. This exceeds the 800m zone of sensitivity for the species (McGuinness et.al 2015). The proposed amenity trail is the only infrastructure located in proximity to Drinagh. The trail follows an existing track at this location and no significant displacement is predicted.</p> <p>Significant effects with regard to habitat loss are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | This species was not recorded in flight during the extensive VP survey work undertaken. While collision risk modelling can therefore not be carried out, this does not mean that the collision risk cannot be assessed, but instead it means that the collision risk, within the accuracy levels available to the assessment, is zero.  | <b>No Effect</b>  | <b>No Effect</b>                            |

### 7.8.2.13 Buzzard (All Seasons)

Table 7-25 Impact Characterisation for Buzzard based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
| <b>Construction Phase</b>  |  |  |   |
| <b>Direct Habitat Loss</b>   | <p>This species was frequently recorded within the development site during the breeding and winter seasons. No evidence of breeding activity was recorded within the development site, although there was one confirmed breeding territory and one possible breeding territory in areas of conifer plantation within 500m of the development site. Furthermore, there were three confirmed breeding territories located between one and two kilometres of the development site. Therefore, the proposed development will not result in the loss of any identified or traditional nest sites.</p> <p>Substantial areas of undisturbed suitable foraging habitat will remain beyond the development footprint.</p> | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>There was no evidence of breeding activity within the development site during either the 2018 or 2019 breeding seasons. Given the availability of potential nesting and foraging habitat in the wider area, no significant effects are anticipated.</p> <p>The favourable conservation status of this species limits the potential for ecologically significant effects.</p> <p>Significant displacement effects are not anticipated.</p>   | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Short-term Slight Negative Effect</b>    |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|---|--|---|
| Operational Phase  |   |  |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>   | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>This species was frequently recorded within the development site during the breeding and winter seasons. However, there was no evidence of breeding activity within the development site during either the 2018 or 2019 breeding seasons.</p> <p>Pearce Higgins (2009) describes that buzzard has been found to show significant turbine avoidance extending to at least 500m. Despite this, significant effects are not anticipated, given that extensive areas of suitable foraging habitat exists and will remain in the wider area (i.e. outside the 500m buffer zone). Particularly as onsite habitats are not considered unique to the proposed development area.</p> <p>Significant displacement effects are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 3.98 collisions per year. The favourable conservation status of this species (Green-listed BoCCI) limits the potential for ecologically significant effects to result.</p> <p>The loss of four birds from the local population of a Green-listed (BoCCI) species is considered of low significance.</p>  | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Very Low</b> effect significance</p>       | <b>Long-term Slight Negative Effect</b>     |

### 7.8.2.14 Sparrowhawk (All Seasons)

Table 7-26 Impact Characterisation for Sparrowhawk based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|---|--|---|
| <b>Construction Phase</b>  |   |  |   |
| <b>Direct Habitat Loss</b>   | <p>Breeding sparrowhawk were recorded during both 2018 and 2019. There were two breeding territories identified in 2018 and two in 2019. Only one of these was located within the proposed development site. A confirmed nest site with fledged chicks was located in a small area of forestry directly adjacent to the briquette factory and the N62 national road. There will not be any construction activity in this area, therefore direct impacts on this nesting area will not result from the proposed development.</p> <p>Significant areas of suitable nesting and foraging habitat will continue to remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> <p>Significant displacement effects are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>Breeding sparrowhawk were recorded during both 2018 and 2019. There were two breeding territories identified in 2018 and two in 2019. The nest at the briquette factory has been shown to be robust to disturbance given its location adjacent to the N62 national road. Another nest was located within 500m of the proposed development. Construction adjacent to this nest could potentially cause 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.</p>  | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | Short-term Slight Negative Effect           |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017)    |
|--|---|--|--|
|  | <p>The widespread breeding distribution of this species limits the potential for ecologically significant effects to result.</p> <p>Significant displacement effects are not anticipated.</p>   |  |  |
| Operational Phase  |   |  |  |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>   | <b>No Effect</b>                               |
| <b>Displacement</b>  | <p>The proposed development area does not contain habitats that are unique to the local area. Therefore, were displacement to occur it would not result in the loss of a scarce resource for the local sparrowhawk population.</p> <p>Significant displacement effects are not anticipated.</p>   | <p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Very Low</b> effect significance</p>               | <b>Long-term Slight Negative Effect</b>        |
| <b>Collision</b>   | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 0.16 collisions per year, or one collision every 6 years. The predicted collision risk is insignificant in the context of the county, national and international population.</p> | <p>The magnitude of the effect is assessed as <i>negligible</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Imperceptible Negative Effect</b> |

### 7.8.2.15 Kestrel (All Seasons)

Table 7-27 Impact Characterisation for Kestrel based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
| <b>Construction Phase</b>  |  |  |   |
| <b>Direct Habitat Loss</b>   | <p>The Proposed Development site is dominated by scrub and immature birch woodland, with large areas of suitable foraging habitat.</p> <p>Two confirmed kestrel breeding territories were recorded within the development site during the 2019 breeding season surveys. One of these territories occurred within the development site and within 500m of the proposed turbine locations, while the other occurred to the north of the Drinagh wetlands in the area of the proposed substation, and</p> <p>Significant areas of suitable nesting and foraging habitat will continue to remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> <p>Significant displacement effects are not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>The two identified kestrel nest sites are within 500m of the development footprint.</p> <p>Disturbance from construction activities could result in the partial loss of kestrel breeding habitat. However, significant areas of suitable nesting and foraging habitat will continue to remain post construction.</p>  | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Short-term Slight Negative Effect</b>    |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|---|--|---|
| <b>Operational Phase</b>   |   |  |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>   | <b>No Effect</b>                            |
| <b>Displacement</b>  | Raptor studies have generally found only low levels of turbine avoidance (Hötker et al. 2006; Madders & Whitfield 2006), with some species, such as kestrels, known to continue foraging activity close to turbines (Pearce Higgins et.al 2009). Significant effects are not anticipated, given that extensive areas of suitable foraging habitat exists and will remain in the wider area. Onsite habitats are not considered unique to the proposed development area.   | The magnitude of the effect is assessed as <i>Low</i> .<br><br>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Very Low</b> effect significance               | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.<br><br>The collision risk has been calculated at a ratio of 1.62 collisions per year. Annual mortality of adult kestrel has been calculated at 31% per annum (Village, 1990). If 1.62 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the National breeding population (i.e. c.15,000 birds) by 0.03%.<br><br>The predicted collision risk is therefore negligible in the context of the National breeding kestrel population. No significant effects are anticipated regarding collision risk at any geographical scale. | The magnitude of the effect is assessed as <i>Negligible</i> .<br><br>The cross tabulation of <i>Low</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance | <b>Long-term Slight Negative Effect</b>     |

## 7.8.2.16 Snipe (All Seasons)

Table 7-28 Impact Characterisation for Snipe based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|---|--|---|
| <b>Construction Phase</b>  |   |  |   |
| <b>Direct Habitat Loss</b>   | <p>Snipe were regularly recorded during surveys, with observations of drumming or calling snipe during the breeding season frequently recorded. In 2018, 18 breeding territories were recorded. Of these 6 would be transected by development infrastructure. In 2019 ten breeding territories were recorded. Three of these would be transected by development infrastructure (see Appendix 7.4, Figure 7.3.18.1).</p> <p>The loss of breeding habitat will be minimal as the infrastructure is confined to a narrow corridor. Significant areas of suitable nesting and foraging habitat will continue to remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> <p>Significant habitat loss effects are not predicted.</p> <p>In addition, enhancement measures are proposed for the Drinagh wetlands are predicted to be beneficial for this species. Please see Section 7.11 for further details.</p> | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Displacement</b>  | <p>Pearce Higgins et. al (2009), found that breeding snipe showed significant avoidance of turbines extending to a distance of 400m. In 2018, 18 breeding territories were recorded. Of these 13 were recorded within 400m of the turbines, while four were recorded within the Drinagh wetlands to the east of the development infrastructure. The remaining breeding territory was to the</p>   | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i></p>   | <b>Short-term Slight Negative Effect</b>    |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017)    |
|--|---|---|--|
| <b>Construction Phase</b>  |   |   |  |
|  | <p>south of the Cloneen wetlands. In 2019 ten breeding territories were recorded. Five of these were within 400m of the turbines (all in Clongawny bog/west of the briquette factory). The remaining four territories were recorded within the Drinagh wetlands to the east of the proposed turbines.</p> <p>On a precautionary basis it is assumed that some temporary displacement may occur. However, given the extent of suitable habitat in the wider area; significant displacement during the construction phase is not anticipated.</p>   | Impact corresponds to a <b>Very Low</b> effect significance   |  |
| <b>Operational Phase</b>   |   |   |  |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>  | <b>No Effect</b>                               |
| <b>Displacement</b>  | <p>Pearce Higgins et. al (2009), found that breeding snipe showed significant avoidance of turbines extending to a distance of 400m. In 2018, 18 breeding territories were recorded. Of these 13 were recorded within 400m of the turbines. In 2019 ten breeding territories were recorded. Five of these were within 400m of the turbines (all in Clongawny bog/west of the briquette factory).</p> <p>On a precautionary basis it is assumed that some initial displacement may occur but given the extent of suitable habitat in the wider area; significant ongoing displacement during operation is not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>        |
| <b>Collision</b>   | 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 magnitude of the effect is assessed as <i>Negligible</i> .  | <b>Long-term Imperceptible Negative Effect</b> |

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|--|---|---|
| <b>Construction Phase</b>  |  |   |   |
|  | <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7.6.</p> <p>The collision risk has been calculated at a ratio of 0.06 collisions per year, or one collision every 17 years. The predicted collision risk is insignificant in the context of the county, national and international population.</p> | <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance</p> |   |

### 7.8.2.17 Ringed Plover (Breeding)

Table 7-29 Impact Characterisation for Ringed Plover based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
| <b>Construction Phase</b>  |  |  |   |
| <b>Direct Habitat Loss</b>   | <p>Ringed plover were regularly recorded during surveys, with several occupied breeding territories identified. Within the proposed development area, there were three breeding territories identified in 2018 while there were eight breeding territories in 2019, although only five of these were within proximity of the proposed development footprint (see Appendix 7.4, Figure 7.3.19.1). Each breeding territory identified held a single breeding pair.</p> <p>The loss of breeding habitat will be minimal as the infrastructure, in the identified breeding areas, is confined to a narrow corridor. Significant areas of</p> | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)  | Significance of potential effect (EPA 2017) |
|--|---|---|---|
| <b>Construction Phase</b>  |   |   |   |
|  | <p>suitable nesting and foraging habitat will continue to remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> <p>Significant habitat loss effects are not predicted. In addition, enhancement measures are proposed for the Drinagh wetlands are predicted to be beneficial for this species. Please see Section 7.11 for further details.</p>  |   |   |
| <b>Displacement</b>  | <p>In total six areas where breeding occurred, were identified for ringed plover including offsite (i.e. Derrybrat and Noggus) (see Appendix 7.4, Figure 7.3.19.1). The three identified breeding areas that overlap with the development footprint will be subject to disturbance.</p> <p>On a precautionary basis it is assumed that some temporary displacement may occur. However, given the extent of suitable habitat in the wider area; significant displacement during the construction phase is not anticipated.</p> | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <i>Very Low</i> effect significance</p> | <b>Short-term Slight Negative Effect</b>    |
| <b>Operational Phase</b>   |   |   |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>  | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>The three identified breeding areas that overlap with the development footprint will be subject to disturbance (see Appendix 7.4, Figure 7.3.19.1).</p> <p>On a precautionary basis it is assumed that some initial displacement may occur but given the extent of suitable habitat in the wider area; significant ongoing displacement during operation is not anticipated.</p>   | <p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <i>Very Low</i> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003) | Significance of potential effect (EPA 2017) |
|--|---|--|---|
| <b>Construction Phase</b>  |   |  |   |
| <b>Collision</b>   | This species was not recorded in flight at PCH during the extensive VP survey work undertaken. While collision risk modelling can therefore not be carried out, this does not mean that the collision risk cannot be assessed, but instead it means that the collision risk, within the accuracy levels available to the assessment, is zero. | <b>No Effect</b>   | <b>No Effect</b>                            |

### 7.8.2.18 Teal (All Seasons)

Table 7-30 Impact Characterisation for Teal based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |  | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|--|--|---|
| <b>Construction Phase</b>  |  |  |   |
| <b>Direct Habitat Loss</b>   | <p>The majority of observations of this species consisted of individuals foraging, roosting/loafing and flying over the Drinagh wetlands to the east of the proposed turbines during winter months. The proposed amenity trail is the only infrastructure located in proximity to Drinagh. The trail follows an existing track at this location and no habitat loss is predicted. Teal was only occasionally recorded in close proximity of the development footprint and 500m of the proposed turbine locations.</p> <p>Significant effects are not anticipated particularly given the low levels of activity recorded. Extensive areas of suitable foraging habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p> | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003)   | Significance of potential effect (EPA 2017) |
|--|---|--|---|
| <b>Construction Phase</b>  |   |  |   |
| <b>Displacement</b>  | <p>The majority of teal were observed at the Drinagh wetlands to the east of proposed turbine locations. The dominant habitat onsite is cutover bog this habitat is considered to provide sub-optimal foraging habitat for teal. The proposed amenity trail is the only infrastructure located in proximity to Drinagh. The trail follows an existing track at this location and no significant displacement is predicted</p> <p>Significant displacement effects are not anticipated, given extensive areas of suitable habitat will remain post construction.</p> | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Short-term Slight Negative Effect</b>    |
| <b>Operational Phase</b>   |   |  |   |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated  | <b>No Effect</b>   | <b>No Effect</b>                            |
| <b>Displacement</b>  | <p>The majority of observations of this species occurred around the Drinagh wetlands to the east of the proposed turbines. Significant effects are not anticipated particularly given the low levels of activity recorded. The proposed amenity trail is the only infrastructure located in proximity to Drinagh. The trail follows an existing track at this location and no significant displacement is predicted. Extensive areas of suitable habitat will remain post construction and there is an abundance of suitable habitat in the surrounding area.</p>   | <p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Very Low</b> effect significance</p> | <b>Long-term Slight Negative Effect</b>     |
| <b>Collision</b>   | <p>This species was not recorded in flight at PCH during the extensive VP survey work undertaken. While collision risk modelling can therefore not be carried out, this does not mean that the collision risk cannot be assessed, but instead it means that the collision risk, within the accuracy levels available to the assessment, is zero.</p>  | <b>No Effect</b>   | <b>No Effect</b>                            |

## 7.8.3 Effects on Key Ornithological Receptors during Decommissioning

### 7.8.3.1 All Species

Table 7-31 Impact Characterisation for Ornithological Receptors based on Percival (2003) & EPA (2017).

| Analysis of potential effects during construction and operational phases of the Proposed Development |   | Magnitude and Significance of potential effect (Percival 2003) | Significance of potential effect (EPA 2017)  |
|--|---|--|--|
| <b>Decommissioning Phase</b>   |   |  |  |
| <b>Direct Habitat Loss</b>   | Direct or indirect effects are not anticipated                    | <b>No Effect</b>   | <b>No Effect</b>                             |
| <b>Displacement</b>  | 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 |

## Effects on Designated Areas

The Proposed Development is not located within the boundaries of any European or Nationally designated sites important for nature conservation (see Figure 3.1 of accompanying Appropriate Assessment Screening Report). There will be no direct effects on any designated site as a result of the construction, operation and decommissioning of the Proposed Development (see Section 6.8 of Chapter 6 and accompanying Natura Impact Statement).

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

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

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

As per EPA draft Guidance 2017, “a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement” but should “incorporate their key findings as available and appropriate”. This section provides a summary of the key 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 Screening for Appropriate Assessment concluded as follows:

*“Following an examination, analysis and evaluation of the relevant data and information set out within this Screening Report, it cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the proposed development, individually or in combination with other plans and projects, would be likely to have a significant effect on the following sites:*

- River Shannon Callows SAC
- Lough Derg, North-east Shore SAC
- Middle Shannon Callows SPA
- River Little Brosna Callows SPA
- Lough Derg (Shannon) SPA

*As a result, an Appropriate Assessment is required, and a Natura Impact Statement shall be prepared in respect of the proposed development in order to assess whether the proposed development will adversely impact the integrity of these European Sites.”*

The Natura Impact Assessment concludes as follows:

*“Following an examination, evaluation and analysis, in light of best scientific knowledge and the conservation objectives of the site, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the proposed development will not have an adverse impact on any European Sites, either alone or in combination with other plans or projects.”*

7.10

## Mitigation and Best Practice Measures

This section describes the measures that are in place to mitigate adverse negative effects associated with the Proposed Development on avian receptors. Effects on avian receptors have been addressed in two ways:

- Design of the Proposed Development.
- Management of the development phases.

7.10.1

### Mitigation by Design

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

- The proposed development has been deliberately designed to avoid the most sensitive areas for birds within the study area. This includes the Drinagh Wetlands. (Note: the amenity pathway in this area follows the route of an existing track)
- Hard standing areas have been designed to the minimum size necessary to accommodate the turbine model that is selected.
- The proposed substation and associated grid connection will be located entirely within the development site boundary. The proposed wind farm would be connected to the national electricity grid through the existing Dallow/Portlaoise/Shannonbridge 110 kV line which traverses the north eastern part of the site. These areas have been subjected to detailed bird surveys across the two-year survey period.

7.10.2

### Mitigation During Construction, Operation and Decommissioning

The following section describe the mitigation and best practise measures to be implemented during each phase of the Proposed Development.

7.10.2.1

#### Construction Phase Mitigation

The following measures are proposed for the construction phase:

- The removal of woody vegetation will be undertaken outside the bird breeding season which begins on the 1<sup>st</sup> day of March and ends on the 31<sup>st</sup> day of August in any year.
- All woodland/scrub (c. 7.24ha) that is removed to facilitate the construction of the proposed development will be replaced with native tree species (c. 13ha). This will ensure there will be a net gain of woodland within the proposed development area.
- During the construction phase, noise limits, noise control measures, hours of operation (i.e. dusk and dawn is high faunal activity time) and selection of plant items will be considered in relation to disturbance of birds.
- Plant and 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) other relevant legislation.
- An Ecological Clerk of Works (ECoW) will be appointed and will operate for the duration of construction works. Duties will include:
  - Undertake a pre-construction transect/walkover bird survey to ensure that significant effects on breeding birds will be avoided.

- Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Proposed Development site.
  - Oversee management of ornithological and ecological issues during the construction period and advise on ornithological issues as they arise.
  - Provide guidance to contractors to ensure legal compliance with respect to protected species onsite.
  - Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress.
- A Construction and Environmental Management Plan (CEMP) has been prepared. The CEMP will be 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 EIAR. The CEMP is included as an Appendix to Chapter 4.

### 7.10.2.2 Decommissioning Phase Mitigation

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).

## 7.11 Lapwing, Waterfowl and Wader Habitat Enhancement Plan

A potential *Moderate* effect on lapwing has been identified in the form of habitat loss. No significant effects with regard to any other KOR was identified. However, an opportunity to enhance habitat for breeding/wintering waterfowl and waders has been identified and a proposed enhancement plan is included as Appendix 7.8 of the EIAR. The plan focuses on the enhancement of supporting habitat for lapwing but its implementation will also benefit, redshank, black-headed gull, woodcock, ringed plover, whooper swan and snipe.

The plan has considered successful approaches previously implemented by Bord na Móna and BirdWatch Ireland to rehabilitate a section of cutaway bog for breeding waders (including lapwing) at Drinagh. In 2011, following rehabilitation works the number of breeding waders increased significantly: a total of ten wader pairs were recorded in the rehabilitation area in 2011 compared to two pairs in 2010, i.e. prior to any management.

It is proposed that poor-quality degraded bog, that has been colonised with birch scrub, will be rehabilitated to provide breeding habitat for waders (including lapwing). The proposed area comprises approximately 25 hectares and is located within the northern most reaches of the Drinagh wetlands (See Figure 1 in Appendix 7.8). The procedure for calculating the quantum of land which would be required to offset potential impacts is discussed in detail in Appendix 7.8.

The area selected for rehabilitation was chosen due to its proximity to the Drinagh wetlands which provide a greater diversity of invertebrate prey for foraging birds (including chicks). This can be expected to have positive implications for the breeding success of lapwing and other species (Beintema & Visser 1994).

Breeding lapwing require open land that affords unbroken all-round views (fields less than 5ha are avoided), vegetation that remains short in spring (below 8-15cm) and a mosaic of vegetation and bare

ground. Management prescriptions to be implemented by the applicant to ensure suitable breeding habitat is provided include:

- The rehabilitation area will be cleared of scrub to ensure open habitat is provided. The resulting open land will comprise c. 25ha (see Chapter 6).
- The rehabilitation area will be mowed annually in late winter (i.e. mid-February) before earlier breeding birds arrive in March. Mowing will only be required in dry areas. This will ensure vegetation is short in spring. To avoid reeds encroaching in wet areas low pressure tracking machinery will be used for mowing in these areas.
- Measures to establish grassland are discussed in detail in Appendix 7.8.
- The rehabilitation area is slightly elevated above the Drinagh wetland which is located to the south and it contains drains with vertical edges. These drains will be re-profiled and in-filled to allow unfledged chicks to move between dry areas and wetland vegetation in Drinagh.
- The rehabilitation area will be rewetted by drain blocking such that the area would remain damp but will not become inundated with water.
- To the south of the rehabilitation area within the Drinagh wetlands there are large water bodies which contain islands (See Figure 1 in Appendix 7.8). Scrub has encroached in many places. For the benefit of lapwing and other species of conservation concern noted in these wetlands (e.g. black-headed gull and redshank) this scrub will be cleared to provide open breeding habitat on these islands.
- These proposed measures would be undertaken for the lifetime of the wind farm.

The proposed measures are based on previously successful management practises designed and executed by Bord na Móna and BirdWatch Ireland, which provides confidence in their likely success.

Details on the measures and strategies proposed in respect to the habitat enhancement plan can be found in Appendix 7.8.

With the successful implementation of the enhancement plan, the predicted impacts on lapwing will reduce from Moderate to Long Term Slight Effect (EPA, 2017). The implementation of the plan will also have positive effects on additional KOR species and is likely to lead to an overall biodiversity net gain.

## 7.12 Monitoring

### 7.12.1 Commencement and Pre-Construction Monitoring

It is proposed that construction works will commence outside the bird nesting season (1st of March to 31st of August inclusive), in particular sites where lapwing were recorded breeding previously. Any requirement for construction works to run into the subsequent breeding season following commencement will be subject to pre-construction bird surveys to confirm the absence of breeding birds, e.g. lapwing. If breeding activity of species of conservation concern are identified, the nest sites will be located, and no works shall be undertaken within 500m buffer in line with industry best practise. All construction works will be undertaken in compliance with the Wildlife Act.

### 7.12.2 Post Construction Monitoring

A detailed post-construction Bird Monitoring Programme has been prepared for the operational phase of the Proposed Development and is presented in Appendix 7.9. The programme of works will monitor parameters associated with collision, displacement/barrier effects and habituation during the lifetime of the project. Surveys will be scheduled to coincide with Years 1, 2, 3, 5, 10 and 15 of the lifetime of the wind farm. Monitoring measures are broadly based on guidelines issued by the Scottish Natural Heritage (SNH, 2009). The following individual components are proposed:

- Flight activity surveys: vantage point surveys
- Breeding Bird surveys: O'Brien & Smith/Adapted Brown & Shephard.
- Winter Distribution & Abundance Surveys: Winter Transects/Waterfowl Surveys (I-WeBS methods) (with an emphasis on wintering waterfowl).
- Targeted bird collision surveys (corpse searches) will be undertaken with training dogs. The surveys will include detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust.

The area proposed for enhancement would be the subject of ongoing monitoring and management during the operational phase of the wind farm to ensure it is offering supporting habitat for breeding lapwing. The ongoing monitoring will take place during the breeding bird season. The monitoring will seek to identify whether lapwing are utilising the areas under active management for breeding and will be conducted by way of vantage point surveys. These surveys will be undertaken once a month March to August inclusive during monitoring years.

7.13

## Residual Effects

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

- Whooper Swan (Wintering)
- Golden Plover (Wintering)
- Red-necked Phalarope (Breeding)
- Hen Harrier (Wintering)
- Little Egret (All Seasons)
- Merlin (All Seasons)
- Peregrine (All Seasons)
- Lapwing (Breeding & Wintering)
- Black-headed Gull (Breeding)
- Woodcock (Breeding)
- Curlew (Non-Breeding)
- Redshank (Breeding)
- Buzzard (All Seasons)
- Sparrowhawk (All Seasons)
- Kestrel (All Seasons)
- Snipe (All Seasons)
- Ringed Plover (Breeding)
- Teal (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-Moderate** was not identified for any KOR.

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

7.14

## 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 than in a multiple independent additive model)

- **Synergistic** (i.e. the cumulative impact is greater than the sum of the multiple individual effects)

### 7.14.1 Other Projects

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

### 7.14.2 Projects Considered in the Cumulative Impact Assessment

A review of the Planning Register for Offaly, Galway and Tipperary County Council's show that there has been a number of planning applications lodged within the vicinity of the EIAR study area. While planning applications lodged within the EIAR 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 2.7 of EIAR Chapter 2.

### 7.14.3 Assessment of Cumulative Effects

The following species were identified as KORs and were subject to detailed impact assessment: whooper swan, golden plover, lapwing, hen harrier, merlin, peregrine falcon, red-necked phalarope, black-headed gull, redshank, woodcock, buzzard, sparrowhawk, kestrel and snipe. Of these, lapwing was the only species where an impact greater than slight was predicted. As previously discussed, in acknowledgement of the moderate habitat loss/displacement impact identified in Section 7.9.2 a lapwing, waterfowl and wader habitat enhancement plan has been prepared (See Appendix 7.8). With the successful implementation of the enhancement plan predicted impacts on lapwing would reduce from Moderate to Slight (EPA, 2017). Cumulative impacts on lapwing are therefore not predicted.

The creation and provision of habitats is now increasingly used to offset losses caused by infrastructure and commercial development pressures (Morris *et al.*, 2006, Gibbons & Lindenmayer, 2007). The enhancement measures proposed in Section 7.9.2 that were devised for the benefit of breeding lapwing will also provide supporting habitat for other breeding and wintering water birds. The habitat created within the rehabilitation area is considered suitable for several species of breeding waders, e.g. redshank, snipe and curlew. The islands that will be cleared of scrub within Drinagh wetlands will provide suitable nesting habitat for black-headed gull and breeding waterfowl. Wintering water birds are also predicted to benefit from the enhancement measures. The rehabilitation measures would provide foraging and roosting sites for species such as wintering whooper swan, teal, mallard, lapwing, golden plover and tufted duck. Large assemblages of water birds would support foraging raptors, e.g. hen harrier, merlin and peregrine falcon. Finally, and most significantly the implementation of the proposed enhancement measures would safeguard a significant resource (Drinagh wetlands) for biodiversity for the 30-year lifespan of the proposed wind farm. Significant cumulative (direct or indirect) habitat loss are not predicted.

The proposed development was considered in the context of a potential barrier effect in combination with other wind farms in the wider landscape. It is typically considered that a barrier effect is more likely to impact large flocks of migrating water birds than other species groups such as raptors.

However, no important migratory routes for any species were identified during any of the surveys undertaken. Furthermore, the vast majority of the recorded flight activity involved short distance flights between foraging, roosting and breeding site within the study area as discussed in Section 7.5. Therefore, significant cumulative barrier effect is not anticipated.

#### 7.14.4 Summary of Effects

Following consideration of the residual effects (post-mitigation) it is noted that the Proposed Development on its own, will not result in any significant effects on any of the identified KORs. No significant effects on receptors of International, National or County Importance were identified.

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

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

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

#### 7.15 Conclusion

An extensive suite of bird surveys were undertaken across a full two-year survey period in compliance with recommend survey methods for onshore wind farm applications (SNH 2017). A number of key ornithological receptors were identified including a nationally important breeding population of lapwing. In light of this a habitat enhancement plan has been prepared (Appendix 7.8) which reduces the predicted impacts on lapwing from Moderate to Slight (EPA, 2017). No regular commuting/migratory flights were recorded that would constitute evidence of connectivity between the local SPAs and the proposed development area.

No significant effects are predicted on birds due to direct habitat loss or displacement during the construction, operational or decommissioning phases of the Proposed Development. The development will not have significant effects on any KOR recorded either in isolation or cumulatively with other plans and projects.