7 ORNITHOLOGY

7.1 INTRODUCTION

This chapter considers the potential effects of the Project (**Chapter 2: Development Description**) on ornithology. It details the methods used to establish the bird species and populations present within the study area, together with the process used to determine their Nature Conservation Importance. The ways in which birds might be affected (directly or indirectly) by the construction, operation and decommissioning of the Proposed Development are explained and an assessment is made with regards the significance of these effects.

Where negative effects are predicted, the chapter identifies appropriate mitigation strategies therein. The assessment considers the potential effects during the following phases of the Proposed Development:

- Construction of the Proposed Development
- Operation of the Proposed Development
- Decommissioning of the Proposed Development

Common acronyms used throughout this EIAR can be found in **Appendix 1.4**. This chapter of the EIAR is supported by Figures provided in Volume III and by the following Appendix documents provided in Volume IV of this EIAR:

- **APPENDIX 7.1 -** VP Survey Details, 2021-2023
- **APPENDIX 7.2 -** Bird Survey VP Flight Line Data, 2021-2023
- **APPENDIX 7.3 -** Bird Survey VP Flight Line Maps, 2021-2023
- **APPENDIX 7.4 -** Lackan Bay Shoreline Surveys Details, 2021-2023
- **APPENDIX 7.5 –** Transect Surveys - Survey Details, 2022-2023
- **APPENDIX 7.6 –** Transect Surveys - Results, 2022-2023
- **APPENDIX 7.7 –** Merlin, Woodcock and Wader Breeding Survey Details, 2023
- **APPENDIX 7.8** – Winter Hen Harrier Roost Survey Details, 2022-2023
- **APPENDIX 7.9** – Collision Risk Modelling Report

A Construction and Environmental Management Plan (CEMP) is appended to the EIAR in **Appendix 2.1**. The CEMP includes an emergency spillage plan, a peat and spoil management plan, a surface water management plan, a traffic management plan and a waste and resource management plan. The CEMP includes all of the construction phase mitigation proposed within the EIAR. A summary of the mitigation measures is included in **Appendix 18.1**.

7.1.1 Description of the Wind Farm Site

A detailed ecological description of the Proposed Development Site is presented in **Chapter 6: Biodiversity**. Briefly, the site is located approximately 5.2 km northwest of the village of Killala and approximately 2.4 km east of Ballycastle village in north Mayo (see **Chapter 1: Figure 1.2**). The Wind Farm Site covers a total area of approximately 108.06 ha.

The Wind Farm Site, and especially the northern sector, is situated within a landscape which previously had been dominated by blanket bog and heath. Much of this has now been cut or converted to pasture grassland, with fields often small in size and bounded by hedgerows. Commercial coniferous forestry is a feature of the area.

The elevations within the Wind Farm Site range from approximately 20 m to 155 m OD. The highest elevations are in the north of the Wind Farm Site on the southern and eastern slopes of Knockboha Hill (peak of 186 m OD). A further high point of 137 m occurs in the central area (Barnhill). The southern section of the Wind Farm Site is located on lower ground with topography sloping gently to the southeast towards Cloonaghmore Estuary and Killala Bay. The OSI Online Database indicates that Peat (Blanket Bog) is the primary soil type present across the site of the Wind Farm, which overlies Glacial Till derived from Sandstones and Limestones, with Alluvium in river valley bottoms (details in **Chapter 8: Soils and Geology**). The majority of the peat covering the redline boundary area of the site is shallow with a depth of less than 0.5 m.

Ecologically, the area in which the Wind Farm Site is located is dominated by agricultural grassland which varies from Improved agricultural grassland (GA1) to Wet grassland (GS4) depending on intensity of management. Much of the grassland is best described as a semi-improved sward. The fields are mostly bounded by Hedgerows (WL1), which are typically of a low stature. Conifer plantation (WD4) is a main habitat in the area and especially in the southwest sector. Intact Lowland blanket bog (PB3) is now scarce in the area of the Wind Farm, though some relatively intact blanket bog remnants, as well as Cutover bog (PB4), occurs in the northern (Lackanhill) and north-central sectors (Cloonanass-Lissadrone). It is noted that more extensive blanket bog occurs on Knockboha Hill outside of the Wind Farm study area, as well on the extensive plateau area between the R314 and R315 roads to the south of Ballycastle. The watercourses within the study site, which are described in detail in the Aquatic Ecology Assessment and in **Chapter 9: Hydrology and Hydrogeology**, are classified as Depositing/lowland rivers (FW2). Drainage ditches (FW) are associated with most of the pasture fields. Other habitats which occur over small areas are Broadleaved

woodland (WD1), Scrub (WS1), Disturbed ground (ED) (including abandoned quarry), and Buildings and artificial surfaces (BL3).

The Grid Connection Route (GCR), which extends over a length of 13.55 km, is almost entirely along public roads (BL3). The roads typically are lined with low hedgerows (WL1) and grassy verges (GS2).

The options for the Turbines Delivery Routes (TDRs), from the port of Killybegs, Co. Donegal, from Galway Port, Co. Galway, and from Foynes, Co. Limerick are almost entirely along existing public roads (BL3) (details in **Appendix 17.1**).

From a wider conservation perspective, the Killala Bay system is the dominant feature of the local area. Much of the inner bay, including the Rathfran Bay inlet, is designated as an SAC and an SPA, as is Lackan Bay to the northwest of Killala Bay. Further to the west of the Wind Farm Site, extensive expanses of blanket bog become a feature of the landscape.

7.1.2 Details of the Proposed Development

Full details of the Proposed Development are presented in **Chapter 2: Development Description,** with an outline given in **Chapter 6: Section 6.1.1**.

7.1.3 Purpose of this Chapter

- To describe the baseline data collection and assessment methods used;
- To summarise the baseline ornithological conditions;
- To identify and describe all potentially significant effects on ornithology associated with the Proposed Development;
- To set out the design, mitigation and compensation measures required to ensure compliance with nature conservation legislation and to address any potentially significant effects;
- To identify how mitigation measures will be delivered;
- To provide an assessment of the significance of any residual effects in relation to the effects on ornithology and the legal and policy implications;
- To identify appropriate enhancement measures and how these will be delivered; and
- To set out the requirements for pre- and post-construction monitoring.

7.1.4 Statement of Authority

The chapter has been prepared by Dr. Brian Madden of BioSphere Environmental Services. The baseline ornithology surveys between 2021 and 2023 were carried out by Brian Madden, Conor Ryan, Mick Hogan, Hannah Keogh, David Miley and Joe Adamson.

Brian Madden BA (Mod.), Ph.D, MCIEEM graduated in Natural Sciences from the University of Dublin in 1984 and earned a Ph.D. degree in 1990 from the National University of Ireland for his research on ecosystem processes in raised bogs. Brian is an experienced ornithologist, with particular interests in birds of prey and wetland birds. Brian is the principal ecologist with BioSphere Environmental Services. The consultancy specialises in energy related developments, including wind farms, solar farms, overhead power lines and substations.

Conor Ryan B.Sc., M.Sc., MCIEEM is a consultant senior ecologist with BioSphere Environmental Services. Conor is highly experienced (since 2010) in baseline habitat, flora and ornithological survey in both terrestrial and aquatic disciplines. He regularly contributes to Environmental Impact Assessments and ecological monitoring programmes. Conor has worked as ECoW on the Oweninny Phase 2 Wind Farm. As a resident of County Mayo, Conor has a particular interest in the flora and fauna of the county.

Hannah Keogh B.Sc., PGDip qualified in Environmental Science from the Sligo Institute of Technology (2016). She has a particular interest in ornithology and has monitored bird species using ESAS methodology to record the distribution of seabirds offshore; I-WEBS (Irish Wetland Bird Survey) monitoring winter water birds; vantage point monitoring of terrestrial and sea birds; and ringing of seabirds and passerines.

David Miley B.Sc., M.Sc. qualified in Marine Science from NUI Galway in 2010. Since then he has worked on a wide range of bird and mammal species including Red Grouse, breeding Curlew, and Hen Harrier (part of the HH Project). David is particularly interested in survey design and methods, and has an excellent working knowledge of GIS for plotting and interpreting survey results.

Mick Hogan is an expert field ornithologist and has worked on various projects with BioSphere Environmental Services for up to 10 years. Based in Westport, Co. Mayo he has particular experience of the bird life of the western seaboard and is a founding member of the Mayo branch of Birdwatch Ireland. Mick regularly carries out baseline surveys using the SNH Vantage Point methodology, as well as surveys for Red Grouse (under licence),

breeding Merlin and winter waterbird surveys (I-WeBS). Mick holds a Higher Diploma in Marine and Countryside Guiding/Marine Interpretation received from G.M.I.T in 2002.

Joe Adamson B.Sc., M.Sc., MCIEEM is a consultant senior ornithologist with BioSphere Environmental Services. He is highly experienced, having worked in the field of ornithology and ecology since 1988 and has extensive knowledge of Irish birds and their habitats. Joe is particularly familiar with the birds of peatland habitats and has carried out baseline bird surveys on a range of other sites in Co. Mayo, including Oweninny Wind Farm.

David McGillycuddy is an ecologist with Veon and prepared the Collision Risk Modelling report (**Appendix 7.10**). David is an experienced ecologist with a strong background in wetlands ecology. David has specialised skills in habitat and species monitoring, habitat restoration and invasive species control. David holds a First-Class Honours Bachelor of Science in Wildlife Biology from Munster Technological University.

7.2 METHODS

7.2.1 Study Area

As the Wind Farm is located over a large area (approximately 6 km from north to south and up to 2 km from east to west), with large tracts of countryside between the locations of the turbines and other infrastructure, the approach was to focus on the distribution of the turbines (mostly in clusters of two or more) rather than trying to achieve blanket coverage of a large area. All lands within the Redline Boundary for the Proposed Development were included within the study area as well as adjoining areas to a distance of at least 500 m from infrastructure.

The study area for the assessment of collision risk is the 'flight activity survey area' or 'FASA' which refers to a polygon around the outermost turbines plus an additional 500 m strip around that polygon.

Due to the ornithological importance of Lackan Bay (part of Killala Bay/Moy Estuary SPA), particular attention was focused on the strip of land between the bay and the Wind Farm to determine the potential for flightlines towards the Wind Farm.

The study area included the GCR and the TDR. However, as it was considered unlikely that the proposed works along these respective routes (largely within public roads lined by hedgerows) will have a significant effect on bird species, detailed surveys for birds were not carried out for these components of the Proposed Development. However, the potential

effects on birds by activities such as hedge trimming and tree pruning along parts of the TDR has been assessed.

7.2.2 Desk study

For birds, a desktop study was conducted prior to the commencement of the field surveys. The following principal information sources were examined:

- Ordnance Survey Ireland (OSI) aerial photography and 1:50,000 mapping, and other sources of online aerial imagery (to assess physical features and habitats which may potentially support important bird species).
- Review of Bird Atlas (Balmer *et al*. 2013).
- Review of Birds of Conservation Concern in Ireland (BoCCI) 2020-2026 (Gilbert *et al*. 2021).
- Review of BirdWatch Ireland I-WeBS (Irish Wetland Bird Surveys) site information (www.birdwatchireland.ie).
- Review of the 2015 National Survey of Breeding Hen Harrier in Ireland Report (Ruddock *et al*. 2016) and 2022 National Survey of Breeding Hen Harrier in Ireland Report (Ruddock *et al*. 2024).
- Irish Bird Reports and the journal *Irish Birds*, published by BirdWatch Ireland.

7.2.3 Target species

Target species are typically those species which are afforded a higher level of legislative protection, or which are considered to be more sensitive to potential impacts from wind farm developments by virtue of their behaviour (SNH 2025).

The results of the comprehensive desk-top study, in conjunction with a site reconnaissance survey prior to the commencement of any surveys, were used to identify target bird species which were considered likely to occur in the study area. These target species formed the main focus of the bird surveys undertaken.

In conjunction with the findings of the desk-top study, the target species list was drawn from:

- Annex I of the Birds Directive as amended.
- Species protected under the Fourth Schedule of the Wildlife Acts 1976-2022 (buzzards, eagles, falcons, harriers, hawks, kites, osprey, owls).
- Red-listed birds of Conservation Concern (Gilbert *et al.* 2021).
- Special Conservation Interest (SCI) species of SPAs within a 10 km radius of the Site.

To ensure other species which may potentially be sensitive to wind farms were not missed during surveys, all other species of gull, wader, duck, diver, goose, swan, cormorant and heron were included as secondary species. It is generally considered that passerine species are not significantly impacted by wind farms (SNH, 2025); however, their presence was recorded to provide a complete picture of bird usage of the Site.

Table 7.1 lists the species which were identified as target species for the study area. The conservation status for each species is given.

Table 7.1: Target species identified for the Tirawley Wind Farm Study Area.

Target Species	Conservation Status	Target Species for Site Y/N
Barn Owl (*Tyto alba*)	BoCCI Red-listed	**Y**
Buzzard (*Buteo buteo*)	BoCCI Green-listed	**Y**
Curlew (*Numenius arquata*)	BoCCI Red-listed/SCI	**Y**
Golden Plover (*Pluvialis apricaria*)	Annex I EU Birds Directive/ BoCCI Red-listed/SCI	**Y**
Hen Harrier (*Circus cyaneus*)	Annex I EU Birds Directive/ BoCCI Amber-listed/SCI	**Y**
Kestrel (*Falco tinnunculus*)	BoCCI Red-listed	**Y**
Kingfisher (*Alcedo atthis*)	Annex I EU Birds Directive/ BoCCI Amber-listed	**Y**
Lapwing (*Vanellus vanellus*)	BoCCI Red-listed/SCI	**Y**
Long-eared Owl (*Asio otus*)	BoCCI Green-listed	**Y**
Merlin (*Falco columbarius*)	Annex I EU Birds Directive/ BoCCI Amber-listed	**Y**
Peregrine Falcon (*Falco peregrinus*)	Annex I EU Birds Directive / BoCCI Green-listed	**Y**
Red Grouse (*Lagopus lagopus*)	BoCCI Red-listed	**Y**
Snipe (*Gallinago gallinago*)	BoCCI Red-listed/SCI	**Y**

Target Species	Conservation Status	Target Species for Site Y/N
Sparrowhawk (*Accipiter nisus*)	BoCCI Green-listed	**Y**
Whooper Swan (*Cygnus cygnus*)	Annex I EU Birds Directive/ BoCCI Amber-listed/SCI	**Y**
Woodcock (*Scolopax rusticola*)	BoCCI Red-listed	**Y**

7.2.4 Field surveys

Baseline field surveys reported here were carried out between April 2021 and June 2023. The surveys carried out comprised the following:

- Flight activity (Vantage Point) surveys
- Lackan Bay coastal survey
- Breeding & winter bird transect surveys
- Breeding merlin survey
- Breeding woodcock survey
- Breeding wader survey
- Winter hen harrier roost survey

Flight activity (vantage point) surveys

Flight activity surveys at the Wind Farm Site were carried out over a 24-month period from April 2021 to March 2023 following the methods described in Scottish Natural Heritage (2017) (now NatureScot). Five vantage points were selected which gave full coverage of the 16 turbine locations, as well as surrounding areas. The locations of the vantage points, with the viewshed analysis shown for each, are presented in **Plate 7.1**. Details (dates, times etc.) of the vantage point surveys are given in **Appendix 7.1.**

VP 1 was located on a bog track in the Lissadrone area of the Wind Farm Site. This gave sweeping views southwards over the areas of cutover bog, wet grassland fields and conifer plantation. Locations for turbines AT07 and AT08 are viewed from this vantage point.

VP 2 was located on a forest road leading off the R314. This is looking eastwards over mainly agricultural land and forestry. Locations for turbines AT01, AT02, AT03, AT04, AT05 and AT06 are viewed from this vantage point.

VP 3 was located at the edge of the abandoned quarry at Castlelackan Demesne. This is looking northwest over mainly agricultural land, bog and forestry. Locations for turbines AT11, AT12, AT13, AT14, AT15 and AT16 are viewed from this vantage point.

VP 4 was located just off a local road at Carrowmacshane. This is looking southeasts over mainly agricultural land, bog and forestry. Locations for turbines AT09, AT10 and AT11 are viewed from this vantage point.

VP 5 was located on a local road in the southern sector of the leading of the proposed Wind Farm area. This is looking westwards over mainly agricultural land and forestry. Locations for turbine AT01, AT02, AT03 and AT04 are viewed from this vantage point.
A considerable amount of overlap existed between the vantage points.

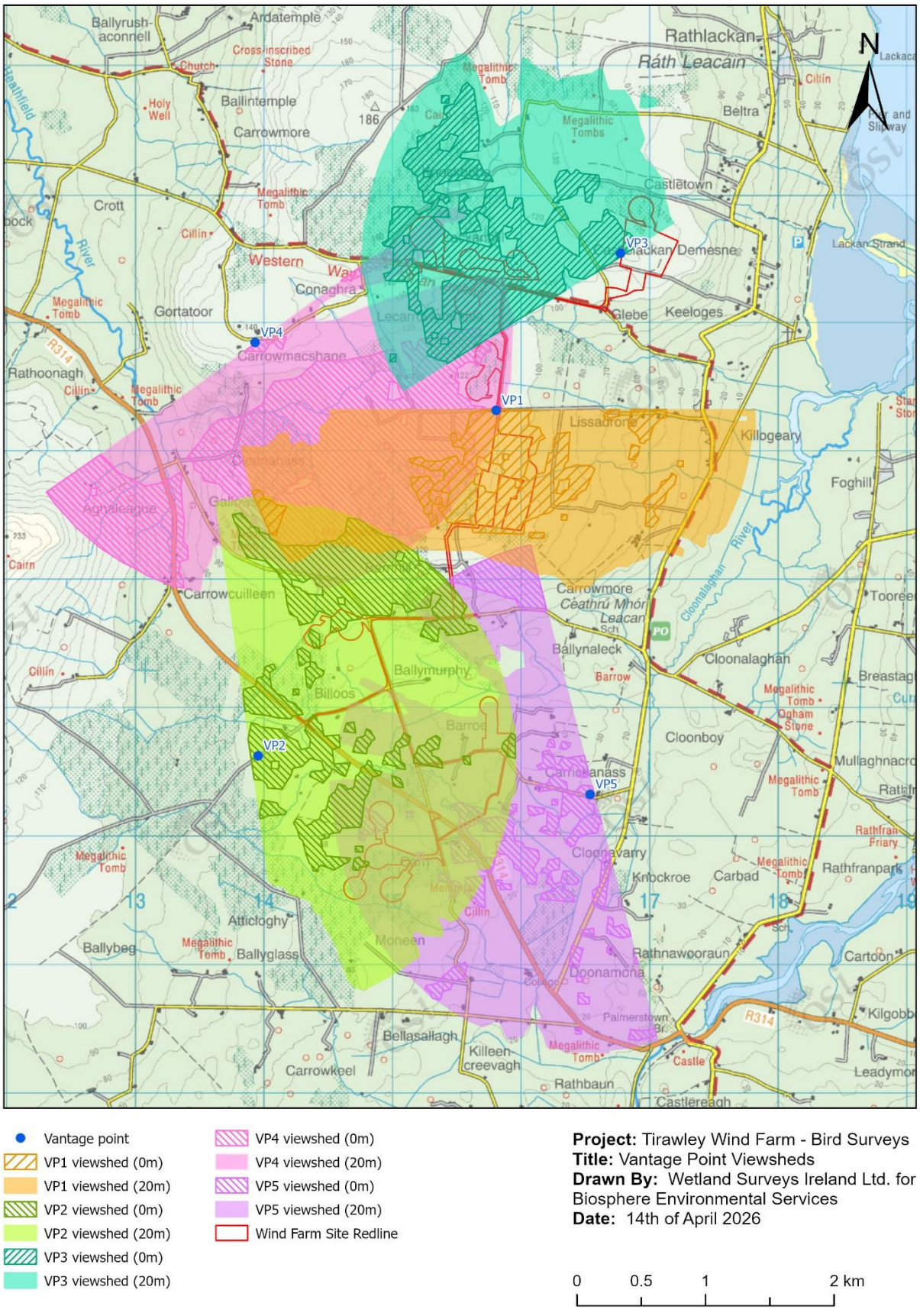

Plate 7.1: Locations of Vantage Points (VP1 – VP 5) and associated viewsheds.

The main purpose of vantage point survey watches is to collect data on *target species* (see **Table 7.1**) for the carrying out of Collision Risk Modelling (CRM). The data collected will enable estimates to be made of:

a. The time spent flying over the defined survey area;
b. The relative use of different parts of the defined survey area; and
c. The proportion of flying time spent within the upper and lower height limits as determined by the rotor diameter and rotor hub height.

Following NatureScot guidance, the method of observing was via constant search effort mostly through binoculars and/or a telescope. During VP surveys the flight behavior of target species was recorded. At the time of each species observation the following information was recorded:

- The time that the bird was detected.
- The flight duration (seconds) within various flight height categories (0-20 m, 20-50 m, 50-100 m, 100-180 m and >180 m).
- Sex and age of the bird(s) (adult/juvenile), where possible to determine
- Type of activity/behavior such as hunting, flying, displaying etc.
- Estimation of actual flight height.
- Habitat(s) where the bird was observed.
- Weather conditions at time of sighting including wind speed, direction, degree of visibility.

Flight activity for each observation was annotated onto a field map.

As per NatureScot guidance (2017, updated March 2025), thirty-six hours of vantage point effort was carried out at each vantage point during each winter period and each breeding period from April 2021 to March 2023 inclusive. The watches mostly comprised two x 3 hour sessions at each VP every month. The proportion of survey time that activity was recorded within the survey area was used as part of the overall analysis and assessment of target species usage of the study area. Surveys were conducted during suitable weather conditions and a proportion of surveys spanned dawn and dusk periods.

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

The results of the comprehensive desk-top study were used to identify target bird species which were considered likely to occur in the study area. These target species formed the main focus of the bird surveys undertaken. Principal target species (or groups of species) were:

- Wildfowl species, such as whooper swan and goose species.
- Waders, especially golden plover and curlew.
- Birds of prey, inc. buzzard, eagles, falcons, harriers, hawks and owls.
- Other Annex I listed species or Red-listed birds of Conservation Concern (Gilbert *et al.* 2021).

It is generally considered that passerine species are not significantly impacted by wind farms (SNH, 2025).

Lackan Bay Shoreline Surveys

Owing to the importance of Lackan Bay, shoreline surveys were carried out from locations along and above the shore to monitor distribution of wetland birds and their movements, as well as potential usage of fields above the shoreline. These were undertaken on a monthly basis from April 2021 to March 2023. Three locations (termed vantage points A, B & C) were selected from which observations were made of species present and any movements inland towards the area of the proposed Wind Farm (see **Plate 7.2**). On each survey date, approximately 2 hours of observations were made from each vantage point. Details (dates, times etc.) of the shoreline surveys are presented in **Appendix 7.4**.

Breeding and Wintering Bird Transect Surveys

Breeding and wintering bird transect surveys were carried out to characterise the bird species associated with the principal habitats across the site. For each of four transects, three surveys were carried out in summer 2022 and three in winter 2022-2023. The method utilised was based on the British Trust for Ornithology Breeding Bird Survey (Bibby *et al.*, 2000). The transects were as follows (see **Plate 7.3**):

- Transect 1 - along road with conifer/deciduous edge and then along track through closed canopy conifer plantation
- Transect 2 - along local road with low hedging leading to AT01 and proposed substation and BESS
- Transect 3 - along local road with low to high hedging leading to R314
- Transect 4 - through semi-improved and wet grassland in area AT07 and AT08

On each survey, the surveyor recorded all birds seen or heard while walking the transect route to a distance of approximately 100 m, though species recorded beyond 100 m were also recorded. Birds in flight only were also recorded. Details (dates etc.) of the transect surveys are presented in **Appendix 7.5**.

Merlin Breeding Survey

Merlin *Falco columbarius* surveys were carried out in order to assess the presence of the species within the Wind Farm study area. Survey methods followed Gilbert *et al.* (1998), with use of transects. Three surveys were completed between April and June in summer 2023. Focus was at areas where bog occurs alongside forest edge, with five sites selected (ML1 - ML5, see **Figure 7.4**). Details of surveys are given in **Appendix 7.7**.

Breeding Woodcock Surveys

Breeding season walkover surveys were carried out at dusk in May and June 2023 (see **Appendix 7.7**). Four of the transects as used for the merlin survey (ML1, ML2, ML4 & ML5) were surveyed for woodcock. These were along forest edge with pasture grassland in the local area. The methodology followed that of Gilbert *et al*. (1998). The surveyors (team of two) walked the transect route at a steady pace, while recording any displaying (roding) woodcock, as well as any other crepuscular or nocturnal species. The surveys were carried out between 21.30 hrs and 00.15 hrs.

Breeding Wader Survey

Areas of suitable habitat for breeding waders were surveyed in summer 2023. Focus was on bog and wet grassland habitats within a distance of at least 500 m of the proposed Wind Farm infrastructure. The survey had a particular emphasis on snipe *Gallinago gallinago* and curlew *Numenius arquata*, though all breeding species associated with bog and wet grassland were recorded.

The survey methodology employed in the 2023 breeding season was based on an adapted Brown and Shepherd (1993) survey method for moorland breeding birds as outlined in Gilbert *et al*. (1998) and SNH (2017). During each survey, transects were walked across the habitats at distances of approximately 250 m apart (as feasible depending on size and shape of the survey plot). Five areas of potentially suitable habitat were selected (BW1 - BW5, see **Plate 7.5**)**.** Locations and activity of breeding birds were recorded on large scale maps.

Three rounds of survey were carried out from mid-April to late-June (see details in **Appendix 7.7)**.

Winter Hen Harrier Roost Surveys

Survey for winter hen harrier roosts was focused on the inner component of Lackan Bay where suitable habitat, i.e. reed beds, exists and hen harrier winter sightings had been reported by a local observer (Mr Steve Meaney). Surveys were carried out from October 2022 to March 2023 (see **Appendix 7.8**). The methodology followed that used in the Irish Hen Harrier Winter Roost Survey (O'Donoghue 2019).

7.2.4.1 Survey Limitations

The information provided in this assessment accurately describes the baseline ornithological interests within the area of the Wind Farm Site.

The specialist surveys, analysis and reporting have been undertaken in accordance with the appropriate guidelines and within the recommended seasonal time periods for breeding and wintering birds.

As the site surveys for ornithology commenced in summer 2021 and were largely concluded in summer 2023, the survey data are approaching 3 years of age or are more than 3 years of age (with reference to the CIEEM Advice Note "*On the Lifespan of Ecological Reports & Surveys*", April 2019).). An appraisal of the lifespan of the survey data in the context of assessing impacts by the Proposed Development is presented in **Appendix 6.5**.

Overall, it is considered that the assessment as carried out on the baseline survey data provides an accurate prediction of the likely effects on ornithology by the proposed Tirawley Wind Farm, prescribes best practice and mitigation as necessary (including monitoring), and describes accurately the residual effects. It is noted that should pre-construction or construction surveys indicate a requirement for protection of relevant species, appropriate measures (as described in **Section 7.9**) will be taken to comply with all relevant legislation and best practice.

Plate 7.2: Shoreline survey locations (A - C) at Lackan Bay.

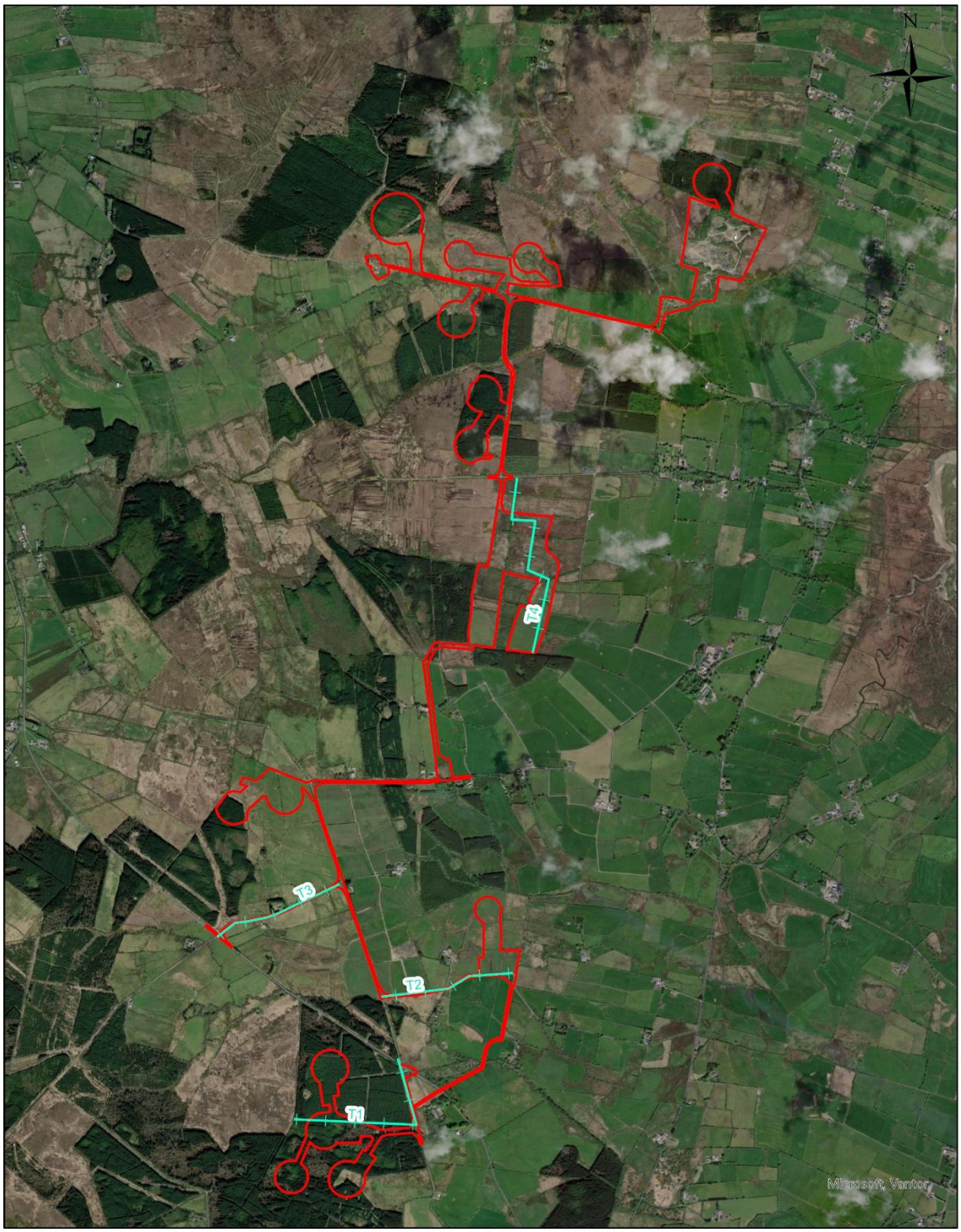

Plate 7.3: Locations of summer and winter survey transects (T1 – T4).

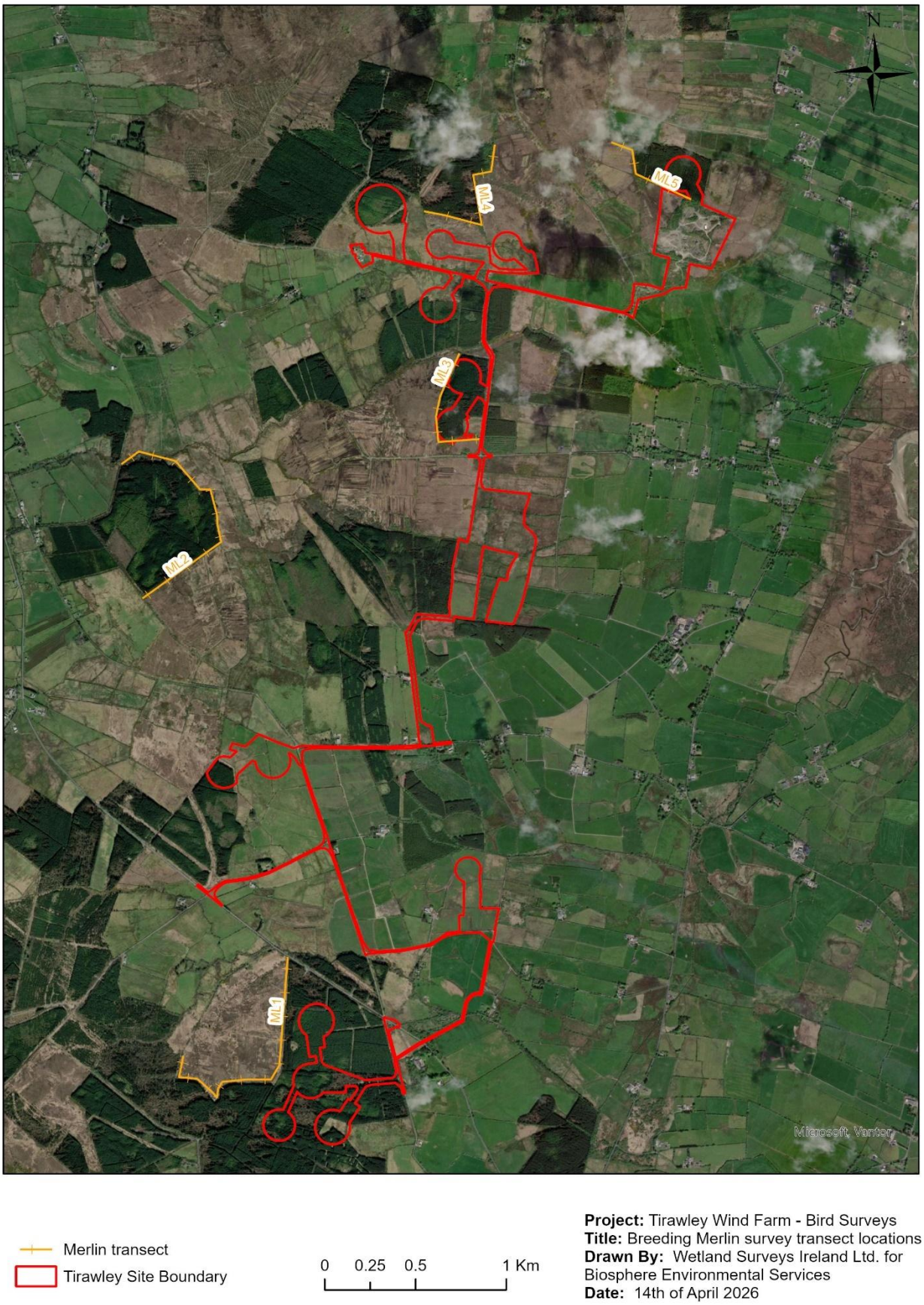

Plate 7.4: Locations of Merlin survey transects (ML1 – ML5).

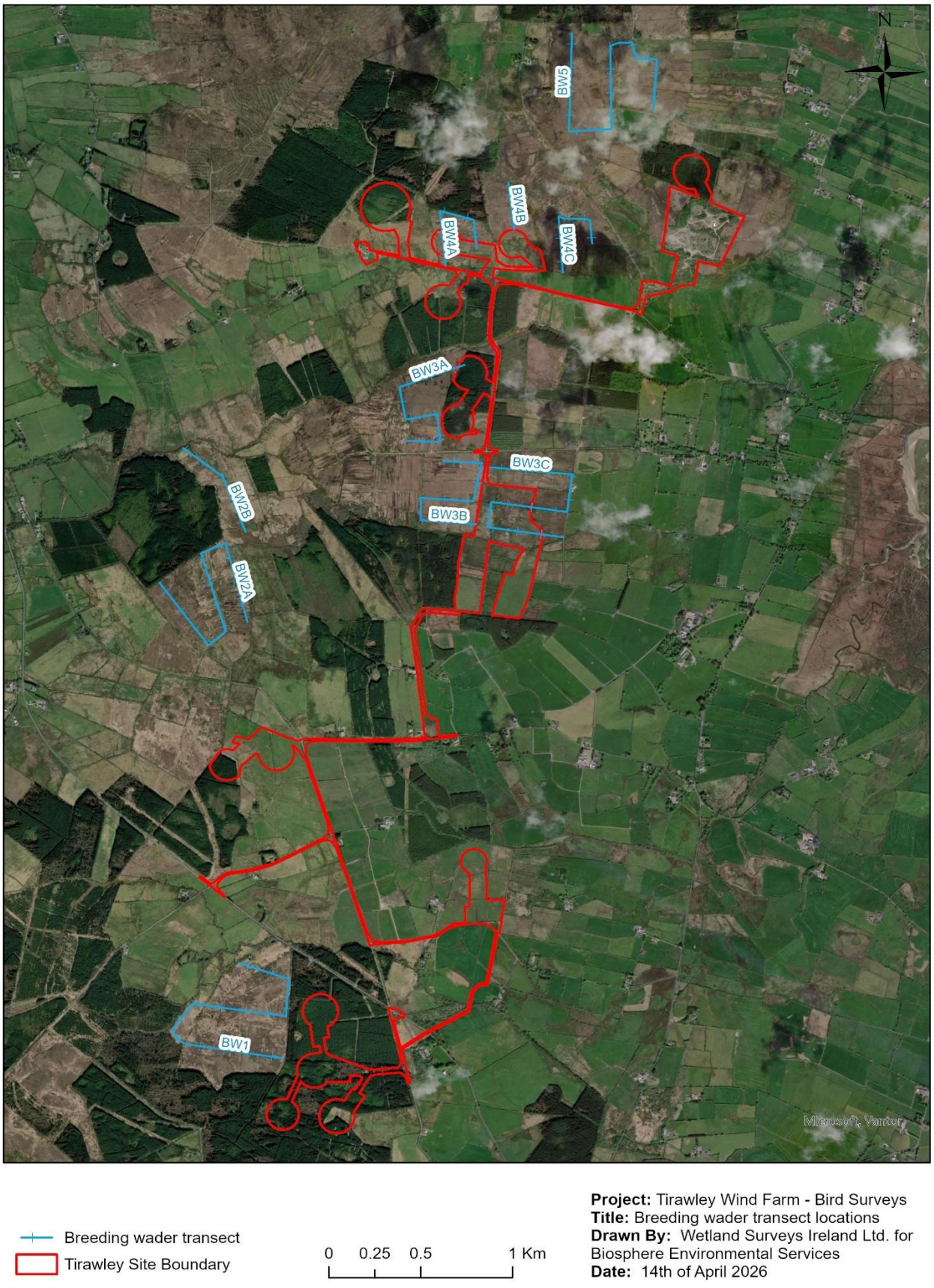

Plate 7.5: Locations of breeding wader survey transects (BW1 – BW5)

7.2.5 Assessment Approach

The impact assessment and ecological evaluation approach used in this report is based on "Guidelines on the information to be contained in Environmental Impact Assessment Reports" (EPA, 2022) and "Guidelines for Ecological Impact Assessment in the UK and Ireland" (CIEEM, 2024).

7.2.6 Sensitivity of Receptors

In line with the recommendations of CIEEM guidelines, only ornithological receptors that are considered to be important, *i.e.* Valued Ornithological Receptors (VORs) and potentially affected by the Project were subject to detailed assessment. It is not necessary to carry out detailed assessment of receptors that are sufficiently widespread, unthreatened and resilient to project effects and would remain viable and sustainable.

Ornithological receptors were considered within a defined geographical context and for this project the following geographic frame of reference is used (following NRA Guidance, 2009):

- International;
- National
- County
- Local (higher value / lower value).

For designated sites, importance reflected the geographical context of the designation. For example, an SPA is considered internationally important while a Natural Heritage Area (NHA) is considered nationally important.

In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include:

- Species of European conservation importance (as listed on Annex I of the Birds Directive); and
- Species Red-listed[2] in Ireland under the relevant lists of Birds of Conservation Concern Ireland (BoCCI), *e.g.* Gilbert *et al*. 2021.

[2] As per current NatureScot (SNH, 2017) guidance, care has been exercised when considering red-listed species for inclusion as a VORs. For example, it is generally considered that passerines are not significantly impacted by wind farms and so red-listed passerines are not considered as significant VORs here.

Where appropriate, the value of species populations has been determined using the standard '1% criterion' method (*e.g.* Holt *et al*. 2012). Using this, the presence of >1% of the international population of a species is considered internationally important; >1% of the national population is considered nationally important; etc.

7.2.6.1 Assessing Impacts and the Significance of Effects

The terms impact and effect are defined by CIEEM (2024) as:

- Impact – Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow.
- Effect – Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow.

CIEEM (2024) guidelines state that when describing ecological impacts and effects, reference should be made to the following characteristics as required: positive or negative; extent; magnitude; duration; frequency and timing and reversibility.

Following the characterisation of impacts, an assessment of the ecological significance of their effects is made. The guidelines promote a transparent approach in which a beneficial or adverse effect is determined to be significant or not, in ecological terms, in relation to the integrity of the defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, which relates to the level at which it has been valued. The decision about whether an effect is significant or not, is independent of the value of the ecological feature; the value of any feature that will be significantly affected is then used to determine the implications, in terms of legislation and / or policy (CIEEM, 2024).

Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of this assessment, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'. A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. The EcIA guidelines (CIEEM, 2024) state that "*A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures as long as the mitigation hierarchy has been applied effectively as part of the*

decision-making process". The assessment of significance is based on professional judgement.

7.3 BASELINE CONDITIONS

7.3.1 Special Protection Areas

European sites in the vicinity of the Proposed Development are detailed in **Chapter 6 (Section 6.3.2)** as well as in the accompanying NIS.

Briefly, the nearest designated Special Protection Area to the Wind Farm Site is the Killala Bay/Moy Estuary SPA (with the Lackan Bay component just over 1 km distance from the north-easternmost sector of the Wind Farm Site), with ecological and hydrological connectivity between the two locations.

The Killala Bay/Moy Estuary SPA also receives drainage from the route of the Grid Connection.

For the other listed SPA sites, there is no ecological or hydrological connectivity with any component of the Wind Farm Site.

7.3.2 Ramsar Sites

Ramsar Convention sites are wetlands that are of significant value for nature in an International context. Killala Bay/Moy Estuary is a Ramsar site (Ramser ID: 843). The site is described as supporting an important sand dune complex as well as important intertidal feeding areas for birds.

7.3.3 Nationally Designated Sites

There are three Natural Heritage Areas (NHAs) within the 15 km radius of the Wind Farm Site (see **Chapter 6, Section 6.3.2.2**). These are blanket bog sites, namely Forrew Bog NHA, Inagh Bog NHA and Ummerantarry Bog NHA. These NHAs are at respective distances of 8 km, 11 km and 8.5 km from the Wind Farm Site.

There is no ecological or hydrological connectivity between these three NHAs and the Proposed Wind Farm Development.

A total of ten proposed Natural Heritage Areas (pNHAs) occurs within a 15 km radius of the Wind Farm Site (see **Chapter 6, Section 6.3.2.3**). Proposed Natural Heritage Areas are

sites of ecological interest though specific qualifying habitats or species have not as of yet been identified by NPWS.

Five of the pNHAs are also designated as SACs and/or SPAs, namely Lackan Saltmarsh and Kilcummin Head, Killala Bay/Moy Estuary, Lough Conn and Lough Cullin, Bellacorick Bog Complex, and Glenamoy Bog Complex. Potential impacts on these five sites are discussed in detail in the accompanying AA Screening Report and NIS.

For the remaining five listed pNHA sites, there is no ecological or hydrological connectivity with the Proposed Wind Farm Development. Three of the pNHAs are presumed to have been identified due to the presence of breeding seabird colonies, as follows:

- Downpatrick Head pNHA (code 00494), located just over 5 km north-northwest of Wind Farm Site.
- Creevagh Head pNHA (code 00482), located approximately 3 km north-north-east of the Wind Farm Site.
- Benedereen Cliffs pNHA (code 00467), located just over 9 km west-northwest of the Wind Farm Site.

The site of the Proposed Development does not provide habitat for breeding seabirds and no cliff nesting seabird species was recorded within the study area during any of the baseline surveys.

7.3.4 Survey Data Presentation

There follows a summary of observations from the various surveys carried out between 2021 and 2023. Full details and results for the surveys are presented in **Appendices 7.1** and **7.8**.

An overview of the status for each species of conservation importance based on the various surveys is then presented.

7.3.5 Flight Activity Survey Results

Hen Harrier

Hen harrier was recorded fairly regularly during the two winter periods, along with records in late August and September 2021 (post-breeding / migratory period). There was a total of 14 records, mostly involving male birds. The majority of records were in the northern sector of the study area. Details of the records are as follows:

- 31st August 2021: male flying / hunting
- 10th September 2021: ringtail flying over bog then perched in dead tree
- 16th September 2021: ringtail hunting over rough fields
- 31st October 2021: adult male flying, then landed in bog
- 21st December 2021: adult male actively hunting
- 30th December 2021: adult male flying low
- 4th January 2022: one flying low
- 22nd February 2022: adult male actively hunting
- 27th February 2022: adult male rose from bog (09.50 hrs) and later landed again
- 19th March 2022: one rose from bog and flew over abandoned quarry
- 11th October 2022: male hunting over bog & wet grassland fields
- 13th November 2022: male hunting over wet grassland fields
- 22nd November 2022: male seen flying briefly
- 23rd January 2023: male hunting over bog, seen dropping into heather

Sparrowhawk

Sparrowhawk was recorded during both the summer and winter surveys though was a relatively scarce species throughout the study area. Most of the records were of single birds hunting or flying. However, pairs were recorded on 21st July 2022 and 24th February 2023, with three together (2 males, 1 female) on 30th December 2021. Observations of sparrowhawk were generally from wooded areas or along hedgerows.

Kestrel

Kestrel was the most frequently recorded target species during both the summer and winter surveys. There were records in all months and distributed throughout the study area. All involved single birds, apart from two birds hunting together on 11th July 2022. Records involved birds flying and/or hunting. Hunting birds were often observed along the edges of conifer forest, over wet grassland and near bog habitats. A bird carrying a prey item was recorded on 22nd October 2021. In addition, perched birds were recorded on occasion.

Buzzard

Buzzard was recorded during both the summer and winter surveys, with records distributed throughout the study area. Birds were recorded flying and/or hunting, with eleven records of pairs circling or soaring (mostly in display).

Merlin

There were two flightlines of merlin though likely to refer to the same individual. On 13th August 2022, a female was observed chasing a small bird over bog/wet grassland near VP2 in southwest sector of study area. The bird land on a post for c. 6 minutes then flew again. About two hours later, another sighting was made of a flying bird which could not be sexed.

Peregrine

Peregrine was observed on three occasions, as follow:

- 21st December 2021: adult flew low near Lackanhill,
- 25th January 2022: one flew over bog to the west of the abandoned quarry at Castlelackan Demesne,
- 17th September 2022: one (probable female) flew south over wet grassland fields between Lissadrone and Carrowmore.

Lesser Black-backed Gull

Lesser black-backed gull was recorded flying within the study area in both summers. The majority of records involved small parties (5 or less), with two records of more than ten birds: 26 on 30th April 2021 and 13 on 17th September 2022. No particular pattern was obvious in the direction of flights.

7.3.6 Lackan shoreline survey results

The shoreline surveys recorded wetland bird species using the Lackan Bay area in each month, as well as any movements inland towards the locations of the proposed turbines.

The results of the shoreline survey (see **Appendix 7.4**) showed that the Lackan Bay estuarine complex is used regularly by a range of wetland species through the year but especially from August to March. Regular species included cormorant, oystercatcher, ringed plover, curlew, black-headed gull, common gull, herring gull and great black-backed gull. The range of species present reflects the sandy character of the bay system. None of the numbers recorded for any species approached the threshold for national importance. For comparison, counts of Lackan Bay from the Irish Wetlands Birds Survey (I-WeBS) for the five winters 2018/19 to 2022/23 are presented in **Table 7.2**. The counts carried out for the present study are generally in line with the I-WeBS data. However, it is noted that whooper swan was recorded in two of the winters (not recorded in present study) and brent geese was recorded in higher numbers than in the present study. The reason for the higher numbers of brent geese in the I-WeBS counts may be that the surveys in the present study were focused on the inner shoreline area rather than the entire bay (as required for I-WeBS).

Inland feeding wetland species were at times observed feeding in the fields between the shoreline and the local Lissadrone-Rathlackan road. This was especially at times of high tide or severe weather and involved oystercatcher, curlew, black-headed gull, common gull and herring gull.

During the surveys, there was only one record of wetland birds flying inland from Lackan Bay - this involved a flock of c. 40 golden plover flying over the village of Rathlackan (from Lackan pier direction) and continuing in a northwest direction on 28th October 2022. Flight height was from approximately 50 m to 120 m. Also, a flock of c. 100 golden plover was observed circling over bog (height of c.100 m) approximately 1 km northwest of Rathlackan on 9th February 2022 (not seen flying from the bay).

Table 7.2: I-WeBS data for Lackan Bay (subsite 0D488), winters 2018/19 to 2022/23. Figures given are peaks for each winter.

Species	Peak	2018/19	2019/20	2020/21	2021/22	2022/23
Whooper swan	25	25	20	-	-	-
Brent goose	65	40	53	55	42	65
Shelduck	9	-	-	-	9	-
Wigeon	19	-	8	-	19	16
Teal	1	-	1	-	-	-
Mallard	6	6	-	-	-	2
Cormorant	88	6	18	19	18	88
Little egret	2	--	-	2	-	-
Grey heron	3	3	-	3	1	-
Oystercatcher	197	197	101	76	69	29
Ringed plover	83	63	-	40	21	83
Golden plover	147	-	-	-	29	147
Grey plover	10	-	-	6	-	10
Lapwing	3	3	-	-	-	-
Knot	12	-	6	-	12	-
Sanderling	53	21	-	30	47	53
Dunlin	103	16	14	9	48	103
Black-tailed godwit	3	-	-	-	3	-
Bar-tailed godwit	20	8	11	6	20	20
Curlew	77	77	52	23	26	40
Redshank	11	4	1	2	10	11

Species	Peak	2018/19	2019/20	2020/21	2021/22	2022/23
Greenshank	3	3	-	-	1	1
Turnstone	16	-	-	11	16	-
Black-headed gull	85	6	14	19	7	85
Common gull	483	483	160	328	83	92
Lesser black-backed gull	4	-	2	-	4	-
Herring gull	31	31	2	15	27	27
Great black-backed gull	446	446	9	9	14	34

"Data in above table were supplied by the Irish Wetlands Bird Survey (I-WeBS), a scheme coordinated by BirdWatch Ireland under contract to the National Parks and Wildlife Service of the Department of Housing, Local Government and Heritage".

7.3.7 Transect Surveys

The results of the transect surveys at the Wind Farm Site are presented in **Appendix 7.5.**

Breeding Birds

Transects 1 to 3 were focused on hedgerows and conifer plantation edge. A range of passerine species, all of which are widespread throughout the Irish countryside, were recorded. These included resident species such as woodpigeon, song thrush, blackbird, robin, wren, coal tit, blue tit, chaffinch, goldcrest, starling and house sparrow (latter three Amber-listed), as well as summer migrants such as willow warbler (Amber-listed) and chiffchaff.

More localised species of the hedgerows were whitethroat and linnet (Amber-listed). Species characteristic of the conifer plantation included blackcap, goldcrest, redpoll and siskin.

Swallows and house martins (both Amber-listed) were recorded feeding over the areas of the three transects and are likely to breed in local farm buildings and residences.

Transect no. 4 was mostly through wet grassland fields with low hedgerows and drains. Two Red-listed species, namely snipe and meadow pipit, were recorded and are expected to breed. Other characteristic species of these habitats were grasshopper warbler, sedge warbler, skylark (Amber-listed), reed bunting and linnet. Cuckoo was heard and is expected to breed locally.

Winter Birds

The winter surveys recorded fewer bird species than in summer and, as in summer, most of those recorded were widespread species of the Irish countryside.

As expected for an agricultural landscape winter thrushes, fieldfare and redwing (Red-listed), were recorded during the November and January surveys, associating with hedgerows and local pasture fields.

Snipe were flushed within the wet grassland fields of transect no. 4, along with small numbers of meadow pipits. Starling occurred in small flocks over the grassland fields.

7.3.8 Merlin Survey

There was no evidence of the presence of breeding merlin within the Wind Farm study area during the merlin surveys in 2023.

However, the species has a presence in the area (see species account in **Section 7.3.12** below).

7.3.9 Woodcock Survey

There was no evidence of the presence of breeding woodcock within the Wind Farm study area during the woodcock surveys in 2023.

7.3.10 Breeding Wader Survey

From the surveys, it is estimated that three snipe breeding territories occur in the study area (see **Plate 7.6**). Two are located on bog and one in wet grassland. All three are in the northern sector of the study area (see **Appendix 7.7)**.

There was no evidence of curlew or any other wader species breeding within the study area.

7.3.11 Hen Harrier Winter Survey

The hen harrier roost survey in winter 2022-2023 indicated that at least one male used the roost on a fairly regular basis (see **Appendix 7.8**). The roost is located within swamp vegetation (reedbeds) in inner Lackan Bay.

Information provided by a local observer (Steve Meaney) indicates that this roost was also in use in winter 2023-2024, with a single male regular and a ringtail on at least one date.

On 27th October 2023, two males and a possible ringtail (latter seen briefly in poor light) were observed settling at the roost.

Observations by Mr Meaney in winter 2025/26 noted 3-4 hen harriers using the roost in the December/January period.

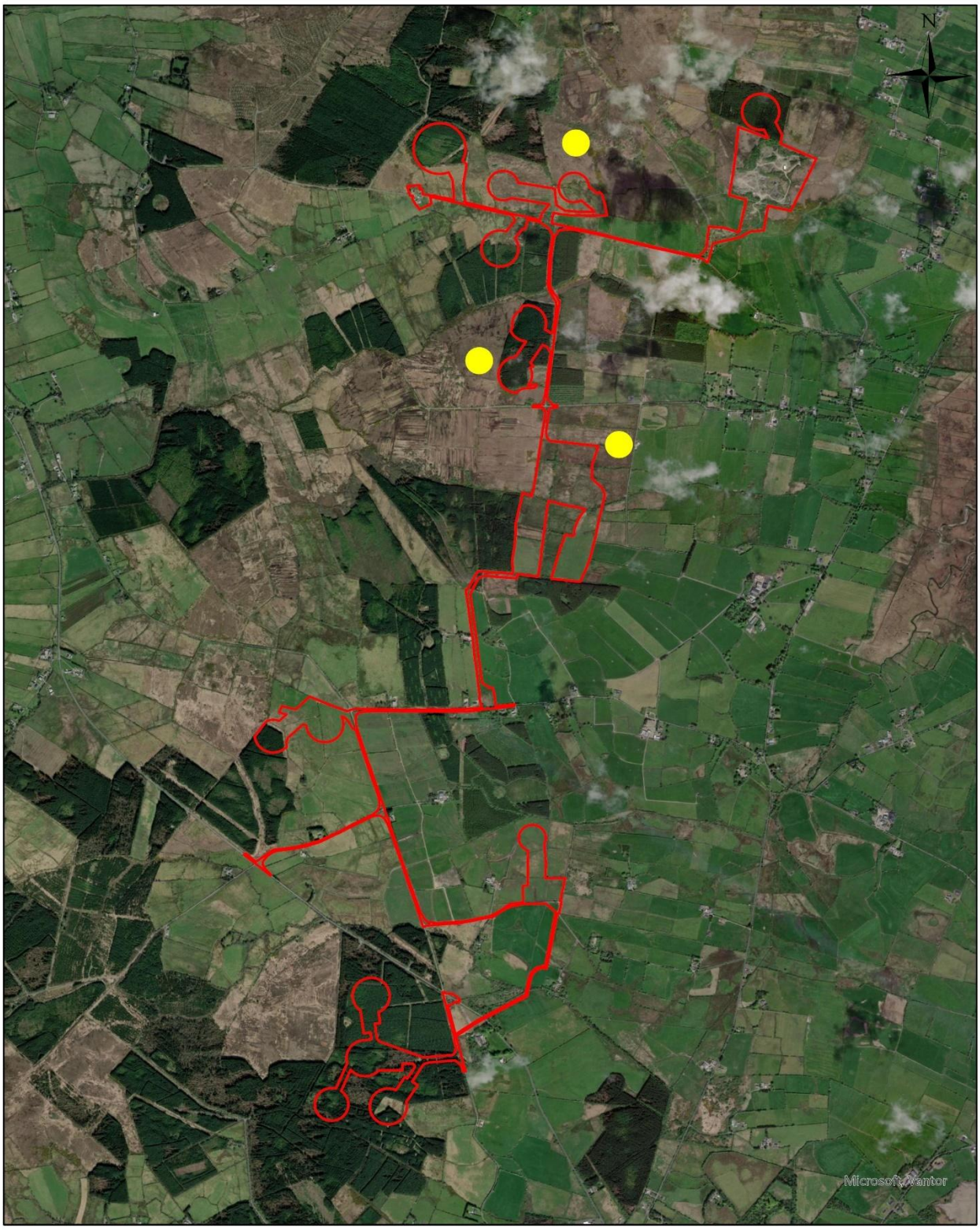

Plate 7.6: Locations of Snipe breeding territories.

From the above, it is likely that hen harriers observed during the flight activity surveys in the northern sector of the study area use this roost (VP 3 is just over 2 km from the roost location).

7.3.12 Evaluation of Ornithological Receptors

The following species, which were recorded during the on-site surveys at the Wind Farm Site are species of European conservation importance (as listed on Annex I of the Birds Directive) and/or are species of national conservation importance (Red- or Amber-listed, after Gilbert *et al.* 2021). Also included are sparrowhawk and buzzard (both Green-listed), as these species are potentially sensitive to wind energy projects. A summary of the status of each species at the Wind Farm Site then follows.

Table 7.3: Conservation status of species recorded within the area of the proposed Tirawley Wind Farm.

Species	Annex I	Red list	Amber list	Green list
Hen harrier	Y		Y	
Sparrowhawk				Y
Buzzard				Y
Kestrel		Y		
Merlin	Y		Y	
Peregrine	Y			Y
Snipe		Y		
Woodcock		Y		
Lesser black-backed gull			Y	
Goldcrest			Y	
Skylark			Y	
House martin			Y	
Swallow			Y	
Willow warbler			Y	
Starling			Y	
Redwing		Y		
Wheatear			Y	
House sparrow			Y	
Meadow pipit		Y		
Linnet			Y	

Hen Harrier – Annex I; Amber List

Hen harrier is an autumn/winter visitor to the study area. Flight activity observations were between 31st August and 19th March, with winter roost observations between 25th October and 13th March.

All flight activity records, apart from one, were from the northern sector of the study area and involved birds hunting and/or flying over grassland and bog habitats. The majority of records were of male birds, with only two ringtails observed.

A winter roost in the Lackan Bay area was used at least in winters 2022/23 and 2023/24. One to two male birds used the roost, with a (probable) ringtail on one occasion in 2023/24. The roost was still in use in winter 2025/26, with three to four birds in December and January.

Four of the flightline records involved birds landing or rising from bog in the Castlelackan Demesne and Lecarrowntemple areas. One of these in particular was early in morning (06.34 hrs on 19th March) which suggests single birds may at times roost on bog.
Overall, the study area is considered to provide good habitat for hen harrier in autumn and winter.

There was no evidence of breeding activity during the surveys and north Mayo is outside of the known breeding range for hen harrier (Ruddock *et al*. 2016, 2024).

Sparrowhawk – Green List

Sparrowhawk was recorded through much of the study area during the vantage point activity surveys and habitats are generally suitable for this species. The species is considered resident in the study area.

Evidence indicated that a pair bred in the conifer plantations in the Ballymurphy to Barnhill area (birds in display and cries heard in July 2023). A juvenile sighted at forestry adjoining the abandoned quarry at Castlelackan Demesne on 11th August 2022 is likely to indicate local breeding (sightings of single birds also from Lackan Hill).

Buzzard – Green List

Buzzard was recorded through much of the study area during the vantage point activity surveys and habitats are generally suitable for this species. The species is considered resident in the study area.

Evidence from displaying pairs indicated that breeding occurred (probably in conifer plantations) in at least three areas - Barnhill, Billoos to Carn, and Knockboha.

Merlin – Annex I; Amber List

There were no records of merlin at the Wind Farm Site during the breeding merlin surveys in 2023.

However, two flightlines (almost certainly referring to the same individual, a female) were recorded over wet grassland fields between VP 2 and the R314 on 13th August 2022. Also, there was an incidental record (whilst driving) of a male bird on 24th September 2022 - this bird flew low across road at Lackanhill (G156374).

Despite the absence of evidence of breeding merlin during the dedicated surveys, it is possible that merlin may breed within the study area (especially in the northern and southwestern sectors), or at least in the wider local area, as the scattering of remnant bog and conifer plantation provides suitable habitat. It is noted that merlin is a particularly difficult species to census and the traditionally used methods may not provide a true indication of the abundance, densities or distribution of the species (Lusby *et al*. 2011).

Kestrel – Red List

Kestrel was the most frequently recorded target species during both the summer and winter flight activity surveys. Much of the Wind Farm study area provides useful hunting habitat for kestrel.

The level of activity recorded for this species, including an observation of two together at Lecarrowntemple (11th July 2022), is indicative of a breeding territory in the vicinity of the Wind Farm Site.

Peregrine – Green List; Annex I

There were three records of peregrine during the flight activity surveys, all outside of the breeding season.

While there are no known peregrine breeding sites within at least a 2 km radius of the Wind Farm Site, the north Mayo coastal strip is a stronghold for the species with up to 11 traditional territories (Madden *et al*. 2009). It is likely that peregrines observed hunting or flying within the study area would be from local breeding territories.

Snipe – Red List

Snipe breeds within the Wind Farm study area and is also a widespread species during winter.

From the breeding wader surveys, three snipe breeding territories were determined within bog and wet grassland habitats. All three are in the northern sector of the study area.
Snipe is a widespread species during winter, mainly in wet grassland and bog.

Woodcock – Red List

Woodcock is a local winter visitor to the Wind Farm Site – there were two incidental records, as follows:

- two birds flushed at dusk whilst driving along bog track just east of VP 1 on 24th November 2021
- one flushed from a bog drain on route to VP 3 (Castlelackan Demesne) on 10th December 2022

There was no evidence of woodcock breeding within the Wind Farm Site study area. It is noted that woodcock is rare as a breeding species in north Mayo (Balmer *et al.* 2013).

Lesser Black-backed Gull – Amber List

Lesser black-backed gull was recorded flying within the study area during summer. Numbers involved were mostly small (<10). Birds commute along the coastline and may at times land in fields such as where silage is being cut.
There are no breeding colonies within at least a 2 km distance of the Wind Farm study area.

Goldcrest – Amber List

Goldcrest is a widespread resident species throughout the study area. It is associated with hedgerows and conifer plantations.

Skylark – Amber List

A widespread breeding species within less managed grassland and bog habitats throughout the Wind Farm Site. Largely absent in winter, returning breeding birds from mid-February onwards.

Swallow – Amber List

Recorded widely feeding over the Wind Farm Site study during summer. Nests mainly in local farm buildings.

House Martin – Amber List

A fairly widespread species during summer associated with buildings.

Willow Warbler - Amber List

A widespread breeding species within hedgerows and woodland areas including conifer plantation.

Starling – Amber List

Starling breeds in buildings throughout the study area. Also a regular winter visitor, with flocks in the hundreds commonly recorded within pasture fields.

Redwing – Red List

Redwing is a widespread winter visitor, usually associated with flocks of fieldfares and sometimes starlings. Occurs in hedgerows and pasture fields.

Wheatear – Amber List

Wheatear was recorded mainly as a spring migrant, mostly single birds. May breed locally.

House Sparrow – Amber List

House sparrow is resident throughout much of the study area. Usually occurs in areas close to farmsteads. Breeds in hedgerows.

Meadow Pipit – Red List

Meadow pipit is a widespread breeding bird in bog and rank grassland fields throughout the Wind Farm Site. Post-breeding flocks in excess of 20 birds often seen in late summer and autumn. It is also present during winter though is relatively small numbers.

Linnet – Amber List

Resident throughout the study area though generally a scarce species. Breeds within areas of scrub. Flocks in excess of 20 birds often recorded in winter.

7.3.13 Overview of conservation importance of the Project area for birds

The Wind Farm Site comprises a mosaic of mainly agricultural land (pasture), conifer plantation, and remnant or cutover bog, supporting a range of bird species most of which are typical of north Mayo and the wider Irish countryside.

While the site is in close proximity to the Killala Bay/Moy Estuary SPA, none of the Special Conservation Interests of the SPA utilise the area of the Wind Farm.

The species of highest conservation importance is hen harrier, which utilises the area for both foraging and roosting in winter (absent as a breeding species). The presence of merlin, albeit on a very local basis, is also of note. Both of these species are listed on Annex I of the Birds Directive.

Snipe, a Red-list species, breeds (3 recorded pairs) within the Wind Farm area and is also widespread in winter. Kestrel, also Red-listed, hunts within the Wind Farm Site area through the year and is likely to breed locally. Woodcock (Red-list) is a scarce winter visitor to the area. Two red-listed passerine species, meadow pipit (resident) and redwing (winter) are widespread throughout the study area.

A range of Amber-listed species breed within the Wind Farm Site, including skylark, swallow, willow warbler, starling, house sparrow and linnet.
The Green-listed sparrowhawk and buzzard are both widespread species within the study area.

For hen harrier (winter), kestrel (all year) and snipe (breeding), the study area is rated as of County Importance (following NRA 2009 Guidance). For all other species as described above, the study area is rated as of Local Importance (higher value).

7.4 ASSESSMENT OF EFFECTS

7.4.1 Do Nothing Effect

Without the Proposed Development proceeding, it is expected that the existing main land uses within the site of the proposed Wind Farm, namely agriculture (pastoral) and commercial forestry, will continue.

The value of the Wind Farm Site for birds would be expected to remain fairly similar as at present, though any increase in the extent of forestry in areas of bog could have adverse effects on species such as meadow pipit and snipe.

7.4.2 Construction Phase Potential Effects

7.4.2.1 Habitat loss

As described in **Chapter 6: Biodiversity**, the construction of the Wind Farm will result in the permanent loss of approximately 9.21 ha of habitat, the majority of which comprises

agricultural grassland (improved to wet) and commercial forestry. The principal other habitats affected are blanket bog and hedgerows.

While some bird species of conservation importance are associated with conifer plantation, such as goldcrest and willow warbler (both Amber-listed) but also the Red-listed kestrel (often hunts along forest edge), none is dependent on this (non-native) habitat for breeding and/or wintering requirements. All of these species would be expected to continue to utilise the remaining stands of plantation within the immediate area after the Wind Farm is constructed. Also, it is noted that conifer plantation is a widespread habitat throughout north County Mayo. On the basis that a relatively small amount of conifer plantation is being lost, and that the bird species associated with this habitat will still retain a presence within the Wind Farm Site, the effect on birds due to the loss of conifer habitat to facilitate the Proposed Development is considered Not Significant.

Improved agricultural grassland is generally of low value for birds, though can attract flocks of species such as starling and crows in autumn and winter. Semi-improved wet grassland, depending on the wetness of the sward, can support a relatively wide range of bird species, including skylark, meadow pipit and snipe (mostly wintering birds but occasionally breeding snipe). However, the value of wet grassland for birds depends on the management at the time, with swards which are used regularly for grazing by cattle being of less value than those which are used only for occasional grazing. As agricultural grassland is an abundant habitat throughout County Mayo, the effect by the loss of a relatively small amount to facilitate the Proposed Development is considered Not Significant.

The peatland habitat (mainly blanket bog) at the AT13 location provides habitat suitable for breeding meadow pipit (Red-listed) and skylark, and provides foraging habitat for species such as kestrel and hen harrier. While any loss of bog habitat is of some significance for associated bird species, the significance by the loss of 0.68 ha of bog habitat at this location is rated as a Moderate Adverse Effect of Permanent duration. It is noted that the Biodiversity Enhancement and Management Plan (BEMP) will preserve and enhance an area of 3.94 ha of blanket bog at nearby Castlelackan Demesne for the lifetime of the Proposed Development. The loss of hedgerows (1,604 m permanent & 2,504 m temporary) and scrub (0.29 ha) will reduce available habitat for a range of hedgerow bird species. While some of these species are Amber-listed, including willow warbler, house sparrow and linnet, all are widespread in distribution locally and throughout much of County Mayo. For birds, the loss of hedgerows is rated as an Adverse Effect of Moderate Significance. It is noted that the losses will be offset by an extensive replanting programme (see **Chapter 6: Section 6.5.2.1**)

7.4.2.2 Disturbance to Breeding and Wintering Birds During Construction

The construction phase for the Proposed Development is likely to last approximately 21 months. In this period, on-site activities, including tree felling, civil works and turbine erection works, have potential to cause significant disturbance effects on birds of conservation importance in adjoining areas.

In 2022 NatureScot published "*Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species*" (NatureScot Research Report 1283) prepared by Goodship and Furness. The 2022 publication included 65 bird species.

It is noted that passerine species, such as meadow pipit and skylark, are not perceived as being prone to disturbance by wind farm construction (SNH 2017) and indeed Pearce Higgins *et al*. (2012) found that densities of skylarks and stonechats increased on wind farms during construction.

Of the bird species (apart from passerines) which are identified as of conservation importance within the Tirawley Wind Farm Site study area (see **Table 7.2**), four were recorded breeding (or at least possibly breeding) within 500 m of where construction works will occur – these were sparrowhawk, buzzard, kestrel and snipe. It is noted that the status of these species at the time of construction may have changed and would need to be established at the time by confirmatory pre-construction breeding surveys (see **Section 7.6.1**). However, it is assumed that local populations will exist at the time and the likely effect of disturbance on these species has been reviewed and is considered below. Also considered is the wintering hen harrier population.

It is considered that non-breeding species of conservation importance recorded within the Wind Farm Site study area during the baseline surveys from 2021 to 2023, namely peregrine, woodcock and lesser black-backed gull, would not be affected significantly by disturbance from construction works.

While there was no evidence of merlin breeding within the Wind Farm Site study area, there were records within the study area in August and September 2022, and it is considered possible that merlin may breed within the wider local area as the scattering of remnant bog and conifer plantation provides suitable habitat. Hence, as a precautionary measure merlin will be considered during the pre-construction breeding surveys.

Hen Harrier

Hen harrier occurs within the study area during the autumn and winter periods, with one regularly used night roost located. Breeding hen harriers were not recorded during any of the surveys and were not known to breed in County Mayo in the 2015 or 2022 National Hen Harrier Surveys (Ruddock *et al*. 2016, 2024).

Hen harrier is considered in the NatureScot (2022) review of disturbance distances in birds. The species is rated as of 'medium sensitivity' to disturbance, with a buffer zone of 300 - 750 m suggested for both breeding birds and non-breeding birds.

The winter roost, which is within an area of swamp vegetation in inner Lackan Bay, is at a minimum distance of 1.5 km from the nearest area of construction (turbines AT07 & AT08). Between the roost and the Wind Farm Site, there is active agricultural land, local residences and public roads. On this basis, it is considered that there is no potential for the construction works to have effects on birds entering or leaving the roost area.

Apart from the roost, the potential for disturbance to foraging birds elsewhere in the study area is considered low as hunting birds are still likely to pass through areas of the site away from the immediate construction works area.

Overall, it is considered that the effect on wintering hen harrier as a result of construction works is rated as 'Not Significant'.

Sparrowhawk

The study area provides suitable breeding habitat for sparrowhawk, with breeding considered to have taken place in at least two locations.

Sparrowhawk was not considered in the NatureScot (2022) review of disturbance distances in birds or in the review of 'safe working distances' for forestry workers to sensitive bird species by Currie and Elliot (1997). In the absence of such information, a buffer zone of 100 – 200 m is suggested for breeding birds (as for buzzard, a tree-nesting species, and kestrel, a tree and cliff/crag nesting species, in the NatureScot review).

It is considered that the construction of the Wind Farm would likely have a potential disturbance effect on breeding birds within a distance of up to 200 m from the construction area – this is rated as an 'Adverse Significant Effect' of Short-term duration. Pre-construction surveys will be carried out in suitable breeding habitat within and around the

site and, as required, mitigation will be implemented to reduce the significance of this potential effect on breeding sparrowhawks (see **Section 7.6.1.2)**.

It is considered unlikely that construction works would have effects on birds in the proposed Wind Farm development site outside of the breeding season – significance of potential effect rated as 'Not significant'.

Buzzard

The habitats in the study area are suitable for supporting breeding buzzard. The species was recorded in the study area regularly, with breeding considered to have taken place within the study are in at least three locations.

Buzzard is considered in the NatureScot (2022) review of disturbance distances in birds. The species is rated as of 'low/medium sensitivity' to disturbance, with a buffer zone of 100 - 200 m suggested for both breeding and non-breeding birds.

It is considered that the construction of the Wind Farm would likely have a potential disturbance effect on breeding birds within a distance of up to 200 m from the construction area – this is rated as an 'Adverse Significant Effect' of Short-term duration. Pre-construction surveys will be carried out in suitable breeding habitat within and around the site and, as required, mitigation will be implemented to reduce the significance of this potential effect on breeding buzzard (see **Section 7.6.1.2**).

It is considered unlikely that construction works would have effects on birds within the proposed Wind Farm Site outside of the breeding season when the species is scarce – significance of potential effect rated as 'Not significant'.

Kestrel

The habitats in the study area are considered suitable for supporting breeding kestrel, with breeding expected to have occurred within the study area in at least one location. Kestrel was also observed regularly outside of the breeding season.

Kestrel is considered in the NatureScot (2022) review of disturbance distances in birds. The species is rated as of 'low/medium sensitivity' to disturbance, with a buffer zone of 100 – 200 m suggested for breeding birds and 500 m for non-breeding birds.

It is considered that the construction of the Wind Farm would likely have a potential disturbance effect on breeding birds within a distance of up to 200 m from the construction area – this is rated as an 'Adverse Significant Effect' of Short-term duration. Due to the high conservation status of kestrel, pre-construction surveys will be carried out in all suitable breeding habitat within the site to a 200 m distance of the construction works area and as required, mitigation will be implemented during the breeding season (March-August) to reduce the significance of this potential effect on breeding birds (see **Section 7.6.1.2**).

It is considered unlikely that construction works would have significant effects on birds within the site outside of the breeding season – significance of potential effect rated as 'Not significant'.

Snipe

The baseline surveys within the Wind Farm Site indicated that probably three snipe territories occur.

Snipe was not considered in the NatureScot (2022) review of disturbance distances in birds. However, Pearce-Higgins *et al*. (2012) identified snipe as one of the species showing a reduction (53%) in densities on wind farms during construction. Critically, the authors also found that snipe population densities did not recover after the construction period, with habitat within 400 m of turbines being used less than expected.

From the above analysis, it is considered that the construction of the Wind Farm is likely to have a potential disturbance effect on breeding snipe within a distance of possibly up to 400 m from the works – this is rated as an Adverse Significant Effect of Short-term duration. Due to the high conservation status of snipe, mitigation will be undertaken to reduce the significance of this likely effect on breeding snipe (see **Section 7.6.1.2**).

It is considered unlikely that construction works would have effects on snipe within the Wind Farm Site study area outside of the breeding season as wintering birds are more mobile than breeding birds and are active mainly during darkness – significance of potential effect rated as Not significant.

7.4.2.3 Nest Damage or Destruction

Damage to, or destruction of, active nests during the construction phase, including hedgerow removal and tree/hedge trimming, could contravene Section 22 of the Wildlife Acts 1976 to 2022 as amended.

This applies to all aspects of the Proposed Development *i.e.* the Wind Farm Site, the GCR and TDR.

The effect of loss of nests is rated as a potentially Significant Adverse Effect of Short-term Duration.

Mitigation will be implemented to ensure that loss of nests is avoided or minimised.

7.4.3 Operational Phase Potential Effects

The principal potential effects on birds by the operation of a wind energy project are:

1. collision
2. displacement
3. barrier effects

Disturbance from secondary operations, such as road maintenance, also require consideration.

7.4.3.1 Collision

Collision risk posed to bird species is one of the main environmental concerns associated with wind energy developments (Drewitt & Langston 2006, Band *et al.* 2007, Drewitt & Langston 2008). However, bird species differ widely in their susceptibility to collision mortality. Essentially, birds are at risk of collision only when their flight path overlaps with the rotor blade sweep area of a turbine. It follows that birds whose flight heights coincide with the height of the turbine rotor sweep are most at risk.

The assessment of potential impacts considers and assesses the Vesta V117 - 4.3 MW IEC IIA parameters (16 no. turbines). The turbine parameters can be seen in **Table 7.4**.

Table 7.4: Turbine Parameters: Vesta V117 model.

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	135 m
Rotor Diameter	117 m
Hub Height	76.5 m
Turbine Hardstand (Main Crane Hardstand Area) L x W	65 x 25 m

Collision Risk Modelling (CRM) is a method to estimate the number of birds likely to collide with turbines at the Wind Farm Site. This method uses vantage point data to calculate the risk of collision. In this case, the vantage point data collected over the 24 month period April 2021 to March 2023 (two breeding seasons and two winter seasons) at the Wind Farm Site were used.

Two stages are involved in the model:
Stage 1: This includes the estimation (from vantage point data) of the numbers of birds passing through the wind turbines rotor blades swept air space.
Stage 2: Calculation of the probability of a bird strike occurring with rotor blades. The probability is calculated using a statistical spreadsheet which considers the turbine parameters and avian biometrics.

For the assessment, the updated 2024 guidance by NatureScot was followed. Full details of the collision risk modelling carried out for the Proposed Development are given in **Appendix 7.9**.

At the Wind Farm Site, the following species recorded flights within the rotor sweep height and inside the 2 km arc of the selected vantage points during the Vantage Point surveys:

- Hen harrier
- Sparrowhawk
- Buzzard
- Kestrel
- Peregrine Falcon
- Lesser black-backed gull

Other species of conservation concern were recorded in the vantage point surveys but were excluded from consideration in the collision risk analysis due to the following reasons:
Merlin – this species was observed flying within the collision risk height band during the surveys. However, only two flights meeting the criteria were recorded across all survey years. Thus, due to the low frequency of flights, the collision risk for merlin can be assumed to be effectively zero. As a result, merlin is excluded from further consideration.

The mean number of collisions predicted for the species subject to analyses (with the application of avoidance rates) is summarised in **Table 7.5**.

Collision risk models provide theoretical predictions of the probability of bird collisions with wind turbine rotor blades. The results are affected by sources of uncertainty including natural variability in bird populations, accuracy of the available information regarding species avoidance rates, turbine specifications, and the representativeness of the survey data. As such, the results are considered to be a best estimate of collision risk, rather than a precise figure. As a result, the predicted collision risk should be considered only an indication of the potential collision risk significance for each target species.

Table 7.5: Summary of estimated mean number of collisions (with avoidance rates) predicted for key ornithological receptors over the lifetime of the Proposed Development.

Species	Mean no. of predicted collisions over lifetime of the Project (nominal 35 years)	Mean number of predicted collisions per year	One bird collision every 'x' years
Kestrel	10.5 birds	0.3	3.33 years
Buzzard	10.5 birds	0.3	3.33 years
Lesser black-backed gull	7.0 birds	0.2	5 years
Sparrowhawk	0.0 birds	0.0	-
Hen harrier	0.0 birds	0.0	-
Peregrine	0.0 birds	0.0	-

(Where the number of predicted collisions is shown as 0.0, this indicates that predicted collisions are <0.01 per year)

The collision risk for Kestrel and Buzzard is estimated each at 0.33 birds per year (or 10.5 birds over the nominal 35-year operational phase), and the collision risk for Lesser Black-backed Gull is estimated at 0.2 birds per year (or 7 birds over the nominal 35-year operational phase).

Kestrel, a Red-listed species though fairly widespread in the study area, has a predicted collision risk of 0.33 birds per year or 10.5 birds over a 35-year period. It is noted that kestrel, as well as lesser kestrel (*Falco naumanni*) and American kestrel (*Falco sparverius*), is a genus that is prone to collision (see for instance Barrios & Redrigues 2004, Diffendorfer *et al*. 2021, Hotker *et al*. 2006, Hotker 2008, Lucas *et al*. 2008, Marques *et al.* 2014, Watson *et al.* 2018). This may be partly due to the hovering behaviour of the species, as while birds are hunting and focusing on ground prey, they may be unaware of the turbine position or

may suddenly change their position due to a gust of wind. The hovering height level is often within the rotor sweep of the turbines. Of eight casualties recorded at a wind farm in Cadiz Province, Spain, all were juveniles. While the predicted collision rate is low, and especially in the context of the estimated national kestrel population of 13,500 birds (Lewis *et al.* 2019), considering the high conservation status of the species and the known susceptibility of the genus to collision, the significance of collision risk is rated as a 'Long-term Slight Adverse' effect. Mitigation will be implemented to lessen this risk (see **Section 7.6.2.1**).

Buzzard is a fairly widespread species in the study area and has a predicted collision risk of 0.33 birds per year or 10.5 birds over a 35-year period. While the size of the bird and its tendency to fly relatively low and within the potential collision risk zone makes buzzard prone to collision, the favourable conservation status of this species (Green-listed) limits the potential for ecologically significant effects to result on the local population. Hence, the significance of collision risk for buzzard is rated as Not Significant.

Lesser black-backed gull was recorded passing through the study area during the summer periods. The species, which is Amber-listed, has a predicted collision risk of 0.2 birds per year or 7 birds over a 35-year period. With an estimated All-Ireland breeding population of 4,239 pairs in 2012 (NPWS 2012 Article 12 Report), and a long-term population increase, it is considered that the significance of collision risk for lesser blank-backed gull is rated as a Long-term Slight Adverse effect.

The number of predicted yearly collisions for sparrowhawk, hen harrier and peregrine are either close to or at zero and are considered Negligible (Not Significant).

7.4.3.2 Displacement effect due to turbines

Displacement of birds from otherwise suitable habitat as a result of the presence of wind turbines has been reported as a potential impact of wind turbines (Drewitt & Langston 2006, de Lucas *et al.* 2007, Pearce-Higgins *et al.* 2009). The displacement occurs as a result of behavioural responses that prevent or decrease the use of an area for activities such as nesting or foraging. However, the results of studies on potential displacement have varied widely and in an overall review of the literature Madders & Whitfield (2006) concluded that displacement effects of wind turbines on raptors are negligible for the most part.

It is noted that passerine species, including species such as meadow pipit, are not perceived as being prone to displacement as a result of the presence of wind turbines (SNH 2025).

Consideration of potential for displacement is given for the following species which were recorded within the Wind Farm Site, and which mostly have a high conservation status:

Hen Harrier

While there was no evidence of hen harrier breeding in the study area, the species has a presence during winter within the study area, with birds observed flying and/or hunting over bog, grassland and forestry. A winter night roost is also known within the study area.

In the review of upland raptors and wind farms, Madders and Whitfield (2006) tentatively rated foraging hen harriers as having a 'low-medium' sensitivity to displacement, though all studies appear to have been in the breeding season. Pearce-Higgins *et al*. (2009) cited a predicted reduction in flight activity of 52.5% within 500 m of the turbine array for breeding birds.

As hen harrier is entirely a winter visitor to the site of the Proposed Development, it is expected that hunting birds would still pass through the area when the turbines are in operation and that the potential for disturbance is low and likely to decrease with time. Birds using the night roost at Lackan Bay (c. 1.5 km distance from nearest turbine) would not likely be affected by the presence of the turbines.

On basis of the high conservation value of hen harrier, this potential displacement effect by foraging birds is rated as an adverse effect of Slight Significance and of short- to medium-term duration.

Sparrowhawk

The baseline surveys showed that sparrowhawk is resident within the Wind Farm Site, with breeding occurring.

There appears to be no data to show whether sparrowhawk is displaced from an area around turbines, though in the review of upland raptors and wind farms, for sharp-shinned hawk (*Accipiter striatus*) (same genus as sparrowhawk) Madders and Whitfield (2006) tentatively rated this North American hawk as having a 'low' sensitivity to displacement.
As sparrowhawk is a woodland species that nests in woodland and hunts largely along woodland margins, over scrub and along hedgerows, it is expected that the species will not be displaced from suitable habitat in the vicinity of turbines at the Wind Farm Site - significance of potential effect rated as Not significant.

Buzzard

The baseline surveys showed that buzzard is regular at the Proposed Development site, with breeding occurring within the study area.

In the review of upland raptors and wind farms, Madders and Whitfield (2006) tentatively rated foraging buzzards as having a 'low-medium' sensitivity to displacement. Pearce-Higgins *et al*. (2009) cited a predicted reduction in flight activity of 41.4% within 500 m of the turbine array for breeding birds.

As buzzard is a regular species in the area proposed for the Wind Farm at Tirawley, it is expected that the species could show some signs of displacement around the turbines at the Proposed Development site. It is likely that any displacement effect would be highest in the early period of operation, with some degree of habituation occurring over time. Significance of potential effect is rated as Slight and of short- to medium-term duration.

Kestrel

Kestrel was recorded regularly during the baseline surveys, with breeding and hunting occurring within the study area.

In the review of upland raptors and wind farms, Madders and Whitfield (2006) rated kestrel as having a 'low' sensitivity to displacement. The related American kestrel (*Falco sparverius*) was also given a rating of 'low' sensitivity. Pearce-Higgins *et al*. (2009) found equivocal evidence for weak avoidance of turbines by kestrel.

As kestrel is a very regular species in the area proposed for the Wind Farm at Tirawley, it is expected that the species could show some signs of displacement around the turbines at the Proposed Development site. It is likely that any displacement effect would be highest in the early period of operation, with some degree of habituation occurring over time. Significance of potential effect is rated as Slight and of short- to medium-term duration.

Merlin

As noted, merlin was recorded within the Wind Farm Site on only two occasions.

There appears to be no data to show whether merlin is displaced from an area around turbines, though in the review of upland raptors and wind farms, for prairie falcon (*Falco mexicanus*) (same genus as merlin) Madders and Whitfield (2006) tentatively rated this North American falcon as having a 'low' sensitivity to displacement.

As merlin is a species that nests in trees or on open bog and hunts close to ground level, it is expected that the species will not be displaced from suitable habitat in the vicinity of turbines at the Wind Farm Site - significance of potential effect rated as Not significant.

Snipe

Snipe was recorded breeding and wintering within the Wind Farm Site in the baseline surveys.

It is considered unlikely that the presence of the Proposed Development would have adverse effects on snipe utilising bog and wet grassland habitats. This is particularly so in winter when snipe is a widespread species of wet or partly improved fields within active agricultural lands - significance of potential effect on snipe rated as Not significant.

7.4.3.3 Barrier effect due to turbines

The potential effect of lines of wind turbines creating a barrier effect to passing birds is mostly relevant to locations where migratory species pass regularly. Rees (2012) cites eight published studies of flight behaviour which reported changes in flightlines for swans or geese initially seen heading towards turbines, at distances ranging from a few hundred metres to 5 km (the larger distances were by birds on migration); 50-100% of individuals/ groups avoided entering the area between turbines, but in some cases the sample sizes were small.

As the Wind Farm Site has not been identified through the baseline surveys or desk review as being along a migration route for birds, such as wetland species (swans, geese etc.) or birds of prey, there is not likely to be a barrier effect. Also, the turbines are dispersed over a relatively large area and could not be considered to be arranged in 'lines' with potential for creating a barrier effect.

7.4.3.4 Other wind farm activities effects

Other wind farm activities during the operational phase include turbine servicing and the maintenance and periodic upgrading of Site Access Tracks and substation inspection and maintenance.

Maintenance of Site Access Tracks within the Wind Farm would be an occasional activity and would be relatively minor in terms of construction. It is considered that track maintenance works would not have any measurable effect on the foraging potential of birds

within the Wind Farm Site, including species of conservation importance such as hen harrier, kestrel and snipe.

Maintenance works at the turbines and the Wind Farm Onsite Substation would not be expected to have any effects on local bird populations.

7.4.4 Decommissioning Phase Potential Effects

During the decommissioning works there is a risk of disturbance and subsequent displacement to sensitive breeding species, such as breeding snipe and kestrel. As for the construction phase, appropriate mitigation will be implemented to ensure that disturbance to these species, as well as any other species present at the time of decommissioning which may have a high conservation status, is minimised.

7.5 CUMULATIVE EFFECTS

Chapter 2, Section 2.3.3 of the EIAR identified a total of 14 no. operational, consented and proposed wind farms within a 20 km radius of the site of the Proposed Wind Farm Development (see **Table 6.13** in **Chapter 6** and **Figure 2.3** in **Vol III**). In addition, there are 2 no. single domestic turbines at distances of 1.1 km (north of AT15) and 4.1 km southeast of the Proposed Development. The nearest operational wind farms are the Killala Community Wind Farm Phase 1 (6.0 km) and Killala Community Wind Farm Phase 2 (5.8 km). The Glenora (awaiting a planning decision) and Keerglen (awaiting a planning decision) projects are located at distances of 6.9 and 6.5 km respectively of the Tirawley Site. All the other wind farm projects are at distances greater than 10 km from the Tirawley Site, with the majority located within afforested and bog habitats to the southwest.

Some of the other wind farm sites, such as Glenora, Oweninny Phases 1-3, and Sheskin South, have (in the absence of mitigation) the potential for impacts on bird species of high conservation importance, including red grouse and breeding and/or wintering golden plover. It is noted that these species do not occur within the study site of the Tirawley project.
While there is a hen harrier winter roost within the Oweninny Phase 3 study area, this roost is at a distance of over 15 km from the roost recorded within the Tirawley study area and interchange between the locations would not normally be expected. For both projects, adverse effects on the hen harriers are not anticipated.

Breeding snipe, which occurs within the Tirawley study area, were also recorded within the Oweninny Phases 1-3, Glenora and Sheskin South study areas. With appropriate

mitigation, especially the avoidance of disturbance to birds during the construction phases, significant effects on this red-listed species can be avoided.

Species such as kestrel and sparrowhawk are fairly widespread at most of the wind farm sites with local breeding populations. Mitigation has been proposed as necessary to avoid disturbance to breeding birds.

While the Tirawley Wind Farm will add a further 16 turbines to the total of 222[4] turbines in the 20 km review zone (should all turbines be eventually built), with the location of the majority of turbines at distances of more than 10 km and separated by extensive areas of bog, forestry and agricultural land, and with appropriate mitigation implemented where required, it is considered that the Tirawley Proposed Development will not contribute to a significant effect on bird populations when considered in-combination with other wind energy projects.

An inventory of other permitted or proposed projects (awaiting decisions) bigger than a one-off house within a 10 km distance of the Proposed Development Site has been compiled (see **Chapter 2, Table 2.2)**. Most of the projects are agricultural related developments or the continued use and operation of quarries. A series of the projects granted or under review are associated with the industrial facility at Killala, which is a distance of approximately 7 km from the site for the proposed Tirawley Wind Farm. All of these projects have been, or are, subject to rigorous evaluation of effects on the environment and especially potential for effects on bird species of conservation importance. For these reasons, the Proposed Development will not contribute to any significant cumulative effect on birds when considered in combination with other developments within the study area.

Forestry is a widespread activity within the area of the Proposed Tirawley Development including planting on peatland habitats. While future afforestation may result in the loss of further peatland habitat of value to birds, the proposed development has largely avoided peatland habitat (other than the loss of approximately 0.68 ha of blanket bog at AT13) and will only marginally contribute to a cumulative loss of peatland habitat. It is noted that the proposed project will preserve and enhance an area of blanket bog through the Biodiversity Management and Enhancement Plan.

[4] Decommissioning of the Bellacorick Wind Farm (21 turbines) will take place alongside the construction of the Oweninny Phase 3 Wind Farm (18 turbines)

7.6 MITIGATION MEASURES

7.6.1 Mitigation during Construction Phase

7.6.1.1 Measures for loss of habitat

While habitat loss cannot be mitigated, the loss of bog at the AT13 location will be offset through a BEMP. The BEMP is described in **Chapter 6 Biodiversity** and is presented in full in **Appendix 6.4**.

While the primary objective of the Plan is to preserve and enhance an area of blanket bog habitat, the BEMP will also provide mitigation for loss and disturbance to other habitats as a result of the Proposed Development.

Apart from the required ground to facilitate the siting of AT16 turbine within the abandoned quarry, the Plan area comprises the entire of an abandoned quarry at Castlelackan Demesne, which is within the north-eastern sector of the Wind Farm development area. In addition to blanket bog, the site includes tall willow scrub, ponds and various recolonising habitats since the quarrying activities. While a sector of the quarry will be used for peat and soil deposition derived from the Wind Farm construction works, these areas will later be incorporated into the Plan area as meadow grassland and native woodland. Overall, it is anticipated that over time the biodiversity value of the site will increase substantially for habitats and associated flora and fauna species, including bird species. It is noted that species such as hen harrier, kestrel and snipe were recorded within the Plan area during the baseline surveys.

The loss (both temporary and permanent) of hedgerows, scrub and broadleaved woodland will be off-set by a detailed planting scheme which will provide suitable habitat for bird species associated with these habitats.

7.6.1.2 Measures to minimise potential disturbance to sensitive bird species

The present assessment has identified the potential for significant disturbance effects on four breeding species of conservation importance as a result of the construction works. These species are sparrowhawk, buzzard, kestrel and snipe (and as noted, merlin is included on a precautionary basis). Best available evidence has been reviewed and it is suggested that these species could be disturbed by works, including tree felling, up to the following distances:

Sparrowhawk	200 m
Buzzard	200 m
Merlin	500 m

Kestrel	200 m
Snipe	400 m

Should any of these species be recorded breeding within the given distances of the works area (as established through confirmatory surveys before and/or during construction – see **Section 7.7.1.1**), a buffer zone (using above distances) will be established around the expected location of the nest (location identified as far as is possible without causing disturbance to the bird) and all works will be restricted within the zone until it can be demonstrated by an ornithologist that the species has completed the breeding cycle in the identified area. Any restricted area that is required to be set up will be marked clearly using hazard tape fencing and all site staff will be alerted through toolbox talks.

The above mitigation, as needed, which will apply from March to August (inclusive), will ensure that the works will not have significant adverse effects on the identified species of conservation importance recorded during the baseline surveys or in pre-construction surveys.

7.6.1.3 Measures to minimise potential disturbance to nesting passerine species

A range of passerine bird species breed within the Wind Farm Site, including the Red-listed meadow pipit and the Amber-listed skylark and willow warbler. In compliance with Section 40 of the Wildlife Acts 1976 to 2022 as amended, all vegetation required to be cleared to facilitate any works associated with the Proposed Development, including hedge trimming and tree pruning along the TDR, will be done outside of the restricted period from 1st March to 30th August.

Should it be necessary to remove vegetation during the breeding season, for instance where bramble and ephemeral plant species have become established on ground cleared earlier, this will be surveyed by an ornithologist up to 10 days before any clearance. Should an active nest be located, the area will be restricted from works by a distance where it is considered that the works would not cause disturbance or abandonment of the nest. Such distances, which will vary according to species and local topography, will be determined by the ornithologist. The restriction will be maintained until it is established that any young birds present have fledged.

Should an instance arise where the placement of a restriction would have significant implications for the time frame of the Proposed Development, and where no alternative mitigation is available to prevent disturbance to the nest, the ornithologist will evaluate the

situation in the context of the conservation status of the species and the stage of breeding, i.e. nest with eggs, nest with young chicks, nest with large young near fledging stage, and will advise on the best approach in the context of the Wildlife Acts. In such cases, the local representative of NPWS will be consulted.

With the above mitigation implemented, the effect of disturbance to nesting passerine species can be avoided or reduced to Not Significant.

7.6.2 Mitigation during Operational Phase

7.6.2.1 Control of vegetation at turbine locations

Areas of forest or scrub around turbines which are cleared will be managed to prevent establishment of scrub and rank vegetation which would encourage small mammals and birds and attract species such as kestrel and hen harrier to hunt near the turbines and increase risk of collision. This maintenance will be carried out on an annual basis by mowing or strimming. The managed areas around turbines which will be implemented as mitigation for bats (see **Chapter 6: section 6.5.6.2.3**) will suffice for birds as well. This approach has proved highly effective at several wind farms in central-eastern Spain where the number of collisions with lesser kestrel decreased by 75% to 100% after the ground was superficially tilled to a distance of 80 m from the turbine base (Pescador *et al*. 2019).

7.6.3 Mitigation during Decommissioning Phase

As the decommissioning works will involve works similar to those involved at construction stage, these could result in similar effects on birds. Hence, the mitigation that will be undertaken during construction will also be applied during the decommissioning phase (taking into account changes in bird populations and distributions that may have occurred locally during the operational life of the Proposed Development).

7.7 MONITORING

7.7.1 Pre-construction phase and construction phase

As noted in **Section 7.4.2.2**, confirmatory breeding bird surveys focused on sparrowhawk, buzzard, merlin, kestrel and snipe, will be required in the spring/summer prior to construction to establish the breeding status and distribution within the Wind Farm Site to a distance of up to 500 m from any works area. From the results of monitoring, the likely need for restrictive zones to avoid or minimise the potential for adverse effects on breeding activities will be determined. All monitoring surveys will be undertaken by a suitably qualified ornithologist.

As more than three years will have passed between the baseline surveys in 2021-2023 and the commencement of construction, the surveys will include all target species as the distribution of some species may change in the intervening period.

Any ground clearance of vegetation during the restrictive period March to August (inclusive) that could support breeding birds will be walked to establish the presence of breeding birds (mainly passerines). This will be done by an ornithologist up to 10 days before the clearance works take place. If 10 days elapse without the clearing commencing, a further survey will take place. The focus will be on the area to be cleared but zones up to 100 m (approximately) around the area will also be included. Should a breeding territory be identified, the surveyor will attempt to establish the phase of building, *e.g.* nest building, incubating, feeding young, and will advise the contractor accordingly on measures to be followed (see **Section 7.6.1.3**).

7.7.2 Post-construction phase

Post-construction bird monitoring is required to establish possible effects on bird species as a result of the Proposed Development. The monitoring programme will comprise the following:

Flight activity surveys

Flight activity surveys will be undertaken using the Vantage Point method (Scottish Natural Heritage 2017) during the operational phase of the Wind Farm. This will use the same five vantage points as used for the baseline EIAR surveys. The surveys will be undertaken monthly in Years 1, 2, 3, 5, 10 and 15 of the life-time of the Proposed Development (in accordance with Scottish Natural Heritage Guidance 2009).

Distribution and abundance surveys

Distribution and abundance surveys will be undertaken to monitor short-term and long-term effects (if any) on bird species of conservation importance within the Wind Farm Site. It is proposed that breeding snipe and wintering hen harrier are the key species.

For these two species, the methodology will be similar to as described for the baseline surveys in **Section 7.2.3** (namely Breeding wader survey & Hen harrier winter roost survey). Surveys will be in the same monitoring years as for the vantage point surveys.

Collision searches

Whilst no significant effects on birds due to collision are predicted, the Wind Farm will provide an opportunity to gain baseline data on bird/turbine interaction and hence the Wind Farm Site will be monitored for bird fatalities.

Carcass search was traditionally completed by human observers whose efficiency is influenced by several factors including carcass type, environmental conditions and observer competence. Numerous studies have been conducted demonstrating that dogs have a superior ability to detect bird and bat carcasses than humans, particularly with small carcasses or in dense vegetation (see for example Mathews 2013).

A standard plot size will be selected at each turbine location where search will occur. At the start of each survey, data recorded will include meteorological and ground cover information. The locations of any carcasses found will be recorded by GPS and will be photographed in-situ. The state of each carcass will be recorded on a corpse record card, using the following categories (after Johnson 2003):

- Intact - a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger
- Scavenged - an entire carcass which shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location such as wings, legs, skeletal remains or pieces of skin
- Feather Spot - ten or more feathers at one location indicating predation or scavenging. If only feathers are found, 10 or more total feathers or two or more primaries must be discovered to consider the observation a casualty.

Searcher efficiency and predation tests will be carried out at the commencement of the programme in order to calibrate the results to account for the search dog's ability to find bird corpses and to also account for scavenging of corpses by animals.

The collision searches for birds can be combined with the bat carcass searches which will be carried out in the first three years of operation (post-construction surveys) and subsequently in years 5, 10, 15, 20, 25 and 30 in the spring to autumn periods. In addition, winter surveys will be carried out for birds in each survey year owing to the occurrence of wintering hen harrier in the area.

7.8 RESIDUAL EFFECTS OF THE PROPOSED DEVELOPMENT

With mitigation measures as presented in this report implemented in full, including the BEMP, it is considered that the significance of the predicted adverse effects on birds as a result of the Project will range from Imperceptible to, at most, Slight.

In particular, the localised loss of peatland habitat at AT13 location will be offset by the BEMP and over time the effect on birds will be reduced to a level of Slight Significance. Similarly, the effect on birds by the loss of hedgerows and trees will be offset by a rigorous planting programme and over a medium-term period (up to 15 years) it is considered that the effect will be reduced to the level of Not Significant.

In the absence of mitigation, the construction phase of the Wind Farm may result in disturbance to breeding birds within a distance of up to 500 m of the work area – this is rated as an Adverse Significant Effect of Short-term duration for sparrowhawk, buzzard, kestrel and snipe. With mitigation in place, comprising the use of work restrictive zones around identified nests areas (as determined by survey at the time), the disturbance effect will be avoided completely or, at most, reduced to level of Not Significant.

All construction works associated with the Proposed Development have potential to result in direct effects on breeding birds. However, as surface clearance works will be carried out largely outside of the breeding season (in compliance with the Wildlife Acts), this impact will be avoided. Should removal of any vegetation be required during the breeding season, this would be subject to survey for presence of breeding birds by an experienced ornithologist and appropriate mitigation implemented to avoid or minimise adverse effects.

During the operational phase of the Proposed Development, predicted collision rates for target species have been shown to range from Not Significant (hen harrier, buzzard, sparrowhawk & peregrine) to a Slight Adverse Effect (kestrel, lesser black-backed gull). For kestrel in particular, mitigation will be implemented to discourage birds from hunting close to turbines.

During the operational phase of the Proposed Development, birds may show some avoidance of suitable habitat as a result of the presence of turbines. This is rated as a Slight Adverse effect for hen harrier and buzzard. However, will time and a degree of habituation, this effect is likely to be reduced.

The baseline surveys did not identify any regular migration routes or local movements of wetland bird species or birds of prey through the Wind Farm Site. The Proposed Development is not expected to have any residual effect on migrating species or local wetland bird populations.

With appropriate mitigation in place to prevent effects on the quality of habitats within the Killala Bay/Moy Estuary SPA, significant residual adverse effects on the Special Conservation Interests, as well as Wetlands and Waterbirds, are not predicted (full details in accompanying AA Screening Report and NIS).

7.9 CONCLUSIONS

An assessment of effects on ornithology as a result of the Proposed Wind Farm Development, including the GCR and the TDR, has been carried out based on detailed survey information from 2021 to 2023.

The Proposed Development area comprises a mosaic of mainly agricultural land (pasture), conifer plantation, and remnant or cutover blanket bog, supporting a range of bird species most of which are typical of north Mayo and the wider Irish countryside. While the site is in close proximity to the Killala Bay/Moy Estuary SPA, none of the Special Conservation Interests of the SPA utilise the area of the Wind Farm.

The species of highest conservation importance is hen harrier, which utilises the area for foraging and with night roosting at Lackan Bay. Snipe, a Red-list species, breeds within the Wind Farm area, while kestrel (also Red-listed), hunts within the Wind Farm Site area through the year and is likely to breed locally. A range of Amber-listed species breed within the Wind Farm Site, including skylark, swallow, willow warbler, starling, house sparrow and linnet. The Green-listed sparrowhawk and buzzard are both widespread species within the study area. For hen harrier, kestrel and snipe, the study area is rated as of County Importance (following NRA 2009 Guidance). For all other species, the study area is rated as of Local Importance (higher value).

The principal ornithological effects as a result of the Wind Farm are as follows:

- Loss of 0.68 ha of peatland habitat, which is used by bird species of conservation importance. This loss will be offset by the preservation and enhancement of a 3.94 ha area of blanket bog through a Biodiversity Enhancement Management Plan (BEMP), with the impact on birds reduced to a Slight Adverse Effect.

- The permanent loss of 1.6 km of hedgerow and 0.29 ha of scrub, as well as the temporary loss of 2.5 km hedgerow. With mitigation through a rigorous replanting programme, the effect on birds over time (10 to 15 years) can be reduced to Not Significant.
- Likely construction related disturbance to breeding sparrowhawk, buzzard, kestrel and snipe. With mitigation in place, comprising the use of work restrictive zones around identified nests areas, the disturbance effect will be avoided completely or, at most, reduced to level of Not Significant.
- Likely construction related disturbance to nests of passerine species, including Red-listed meadow pipit, which is rated as a Significant Adverse Effect of Short-term duration. With mitigation by clearance of vegetation outside of breeding season, and ongoing monitoring as required during the construction phase, effect avoided or reduced to Not Significant.
- During the operational phase of the Proposed Development, predicted collision rates predicted collision rates for target species have been shown to range from Not Significant (hen harrier, buzzard, sparrowhawk & peregrine) to a Slight Adverse Effect (kestrel, lesser black-backed gull). For kestrel, mitigation will be implemented to discourage birds from hunting close to turbines and the significance of the effect can be reduced to slight.
- During the operational phase of the Proposed Development, birds (particularly hen harrier and buzzard), may show some avoidance of suitable habitat as a result of the presence of turbines. However, this effect is not likely to be Significant and would be expected to decrease over time due to habitation.
- The baseline surveys did not identify any regular migration routes or local movements of wetland bird species or birds of prey through the Wind Farm Site. The Proposed Development is not expected to have any residual effect on migrating species or local wetland bird populations.
- With appropriate mitigation in place to prevent effects on the quality of habitats within the Killala Bay/Moy Estuary SPA (code 004036), significant adverse effects on the Special Conservation Interests, as well as Wetlands, are not predicted (full details in accompanying AA Screening Report and NIS).
- The Proposed Development includes rigorous ornithological monitoring (in line with best practice guidance) at pre-construction, construction, and operational phases.

7.10 REFERENCES

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