

5.0 Ornithology

5.1	INTRODUCTION.....	2
5.2	METHODS.....	5
5.3	BASELINE CONDITIONS.....	21
5.4	ASSESSMENT OF EFFECTS.....	34
5.5	MITIGATION MEASURES.....	46
5.6	MONITORING.....	48
5.7	CUMULATIVE EFFECTS.....	49
5.8	RESIDUAL EFFECTS OF THE PROPOSED DEVELOPMENT.....	51
5.9	CONCLUSION.....	52
5.10	REFERENCES.....	54

Mayo Planning Authority - Inspection Purposes Only!

5.1 Introduction

This chapter considers the potential effects of the project (details in Chapter 3: 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 project 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 project:

- Construction of the Project
- Operation of the Project
- Decommissioning of the Project

This chapter of the EIAR is supported by the following Appendix documents provided in Volume IV of this EIAR:

- APPENDIX 5.1 - Keerglen Wind Farm: Vantage Point Survey Details, 2019-2021
- APPENDIX 5.2 - Keerglen Wind Farm: Vantage Point Survey Flightline Results, 2019-2021
- APPENDIX 5.3 - Keerglen Wind Farm: Vantage Point Survey Flightline Maps, 2019-2021
- APPENDIX 5.4 – Keerglen Wind Farm: Breeding and Wintering Birds, Transect Survey - Details, 2019-2021
- APPENDIX 5.5 – Keerglen Wind Farm: Breeding and Wintering Birds, Transect Surveys - Results, 2019-2021
- APPENDIX 5.6 – Keerglen Wind Farm: Merlin & Woodcock Surveys, Details and Results, 2021
- APPENDIX 5.7 – Keerglen Wind Farm: Red Grouse Survey Report, 2020
- APPENDIX 5.8 - Keerglen Wind Farm: Hinterland Survey, Details, 2021-2022
- APPENDIX 5.9 – Keerglen Wind Farm: Hinterland Survey, Results, 2021-2022
- APPENDIX 5.10 – Keerglen Wind Farm: Collision Risk Modelling Report

An Environmental Management Plan (EMP) is appended to the EIAR in Appendix 3.5. The EMP includes all of the construction phase mitigation proposed within the EIAR to maintain the environmental quality of the site.

5.1.1 Description of the Wind Farm Site

A detailed ecological description of the development site is presented in Chapter 6 Biodiversity. Briefly, the proposed Keerglen Wind Farm Site is situated approximately 5.5 km to the southwest of Ballycastle, Co. Mayo. The redline boundary for the proposed wind farm site occupies an area of 81.88 ha.

The Wind Farm Site is situated within a landscape dominated by blanket bog, commercial forestry and agricultural land mainly used for stock grazing. The elevations within the wind farm site range approximately from 100 m A.O.D. in the east to a peak of 201 m A.O.D. in the central area of the site. The topography is generally undulating. The site is drained by the Keerglen River and its upper tributary the Fiddauncushanean. The Keerglen River runs eastwards and joins the Ballinglen River which flows northwards just west of the R315. The Ballinglen enters the sea at Bunatrahir Bay.

Ecologically, the wind farm site is dominated by Cutover blanket bog (PB4) and Upland blanket bog (PB2). The cutover bog is in varying stages of recolonisation and recovery following past and more recent peat cutting and harvesting activities for turbary. Generally, past cutover areas have regenerated well (see Plate 5.1). There is a network of established gravel bog tracks throughout the wind farm site.

The redline boundary of the proposed wind farm site is fringed to the west by the Ummerantarry Bog Natural Heritage Area (NHA) (001570), a nationally designated peatland site. This is designated for the presence of relatively intact upland blanket bog and wet heath habitats, with associated breeding golden plover.

The Underground Electricity Export Connection Route, from the proposed 38kV electrical substation at the wind farm to the existing Tawnaghmore ESB Substation or to a Large Energy User at Killala Business Park, is almost entirely along public roads and tracks. The roads typically are lined with low hedgerows (WL1) and grassy verges (GS2).

The option for the Turbines Delivery Route, from the port of Killybegs, Co. Donegal to the Site, is along existing public roads (BL3).



Plate 5.1: View of Keerglen Site looking north-eastwards over blanket bog that has mostly been cut in the past.

5.1.2 Details of the Project

Full details of the project are presented in Chapter 3: Development Description.

5.1.3 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; and
- To set out the requirements for pre- and post-construction monitoring.

5.1.4 Statement of Authority

The chapter has been prepared by Dr Brian Madden of BioSphere Environmental Services. The baseline ornithology surveys between 2019 and 2021 were carried out by Brian Madden, Mick Hogan and Joe Adamson. The Collision Risk Modelling for the project was carried out by David McGillicuddy.

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. Since then, he has carried out habitat assessments for most terrestrial habitats which occur on the island of Ireland. 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.

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 Phases 1 & 2, and on various Bord na Móna cutaway bogs in the midlands.

Mick Hogan is a principal field ornithologist with BioSphere Environmental Services. Based in Westport, Co. Mayo he has particular experience of the bird life of the western seaboard. Mick regularly carries out baseline surveys using the SNH Vantage Point methodology, as well as surveys for Red Grouse (under licence) and winter waterbird surveys (I-WeBS).

David McGillicuddy is an ecologist with Veon and prepared the Collision Risk Modelling report (Appendix 5.10). 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.

5.2 Methods

5.2.1 Study Area

The principal study area was the area within the Blueline Landowner Boundary for the proposed development (see Figure 5.1). However, the study area extended to approximately 3 km from the blueline boundary for the hinterland surveys.

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.

The study area included the Underground Electricity Export Connection Route for the Site to the existing Tawnaghmore ESB Substation or to a Large Energy User at Killala Business Park. However, as it was considered highly unlikely that the Underground Electricity Export Connection Route will have a significant effect on bird species, detailed surveys for birds were not carried out for this component of the project.

The turbine components will be delivered from Killybegs Port to the wind farm site. Tree pruning and removal and hedge/scrub cutting or removal may be required along Turbine Delivery Route. If considered necessary, survey for birds at the locations where trees, hedging or scrub will be removed will be carried out at pre-construction stage of project.

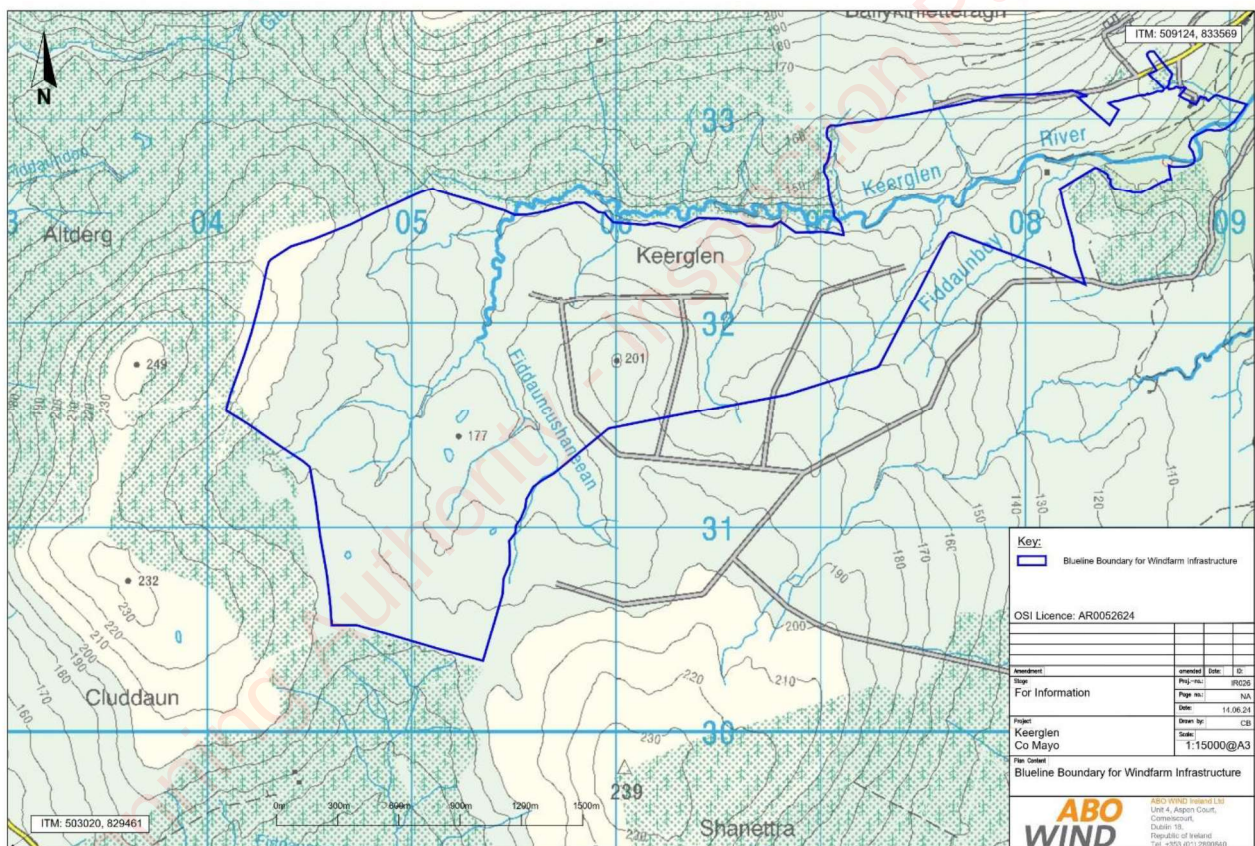


Figure 5.1: Map showing 'Blueline' study area for birds

5.2.2 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.bird-watchireland.ie).
- Review of the 2015 National Survey of Breeding Hen Harrier in Ireland Report (Ruddock *et al.* 2016) and the 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.
- Review of previous bird surveys and assessment for the existing permission.
- Review of bird surveys and assessments carried out for other wind farm projects in vicinity, particularly Glenora Wind Farm (adjoining Keerglen to northwest).

5.2.3 Field Surveys

Baseline field surveys reported here were carried out between April 2019 and February 2022. The surveys carried out comprised the following:

- Flight activity (Vantage Point) surveys
- Breeding & winter bird transect surveys
- Breeding merlin surveys
- Breeding woodcock surveys
- Red grouse breeding survey
- Hinterland surveys

Flight Activity (Vantage Point) Surveys

Flight activity surveys at the wind farm site were carried out over a 24 month period from April 2019 to March 2021 following the methods described in Scottish Natural Heritage (now NatureScot) (2017). Two vantage points were selected which gave full coverage of the redline boundary (other than the extreme eastern access area, which is more than 500 m from the closest proposed turbine), as well as substantial areas beyond. The locations of the vantage points, along with a viewshed analysis, is shown in Figure 5.2a & 5.2b. Both vantage points were located on the 201 m peak within the site as follows:

VP 1 was located to give views over the eastern sector of the site.

VP 2 was located so as to give sweeping views over the entire western sector of the site, including the Ummerantarry Bog NHA which adjoins the redline boundary and parts of the adjoining commercial forestry.

The main purpose of vantage point survey watches is to collect data on *target species* 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 Scottish Natural Heritage 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 Scottish Natural Heritage guidance (2017), thirty-six hours of vantage point effort was carried out at each vantage point during each winter period and each breeding period from April 2019 to March 2021 inclusive. The watches 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, in conjunction with prior knowledge of the wind farm site from the existing permission, 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, 2017); however, their presence during vantage point watches was recorded to provide a complete picture of bird usage of the wind farm site.

Details (dates, times etc) of the vantage point surveys are presented in Appendix 5.1, with full results given in Appendix 5.2. The flightlines of the target species recorded are presented in Appendix 5.3.

Breeding and Wintering Bird Transect Surveys

Breeding and wintering bird transect surveys were carried out in each season. For summer, there were two surveys per year, *i.e.*, total of four summer surveys, while for winter there were three surveys per year, *i.e.* total of six winter surveys. The method utilised was based on the British Trust for Ornithology Breeding Bird Survey (Bibby *et al.*, 2000). Two transect routes were selected which covered the principal habitats within the study area (see Figure 5.3). 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 100m were also recorded. Birds in flight only were also recorded. Details (dates etc) of the bird transect surveys are presented in Appendix 5.4, with results given in Appendix 5.5.

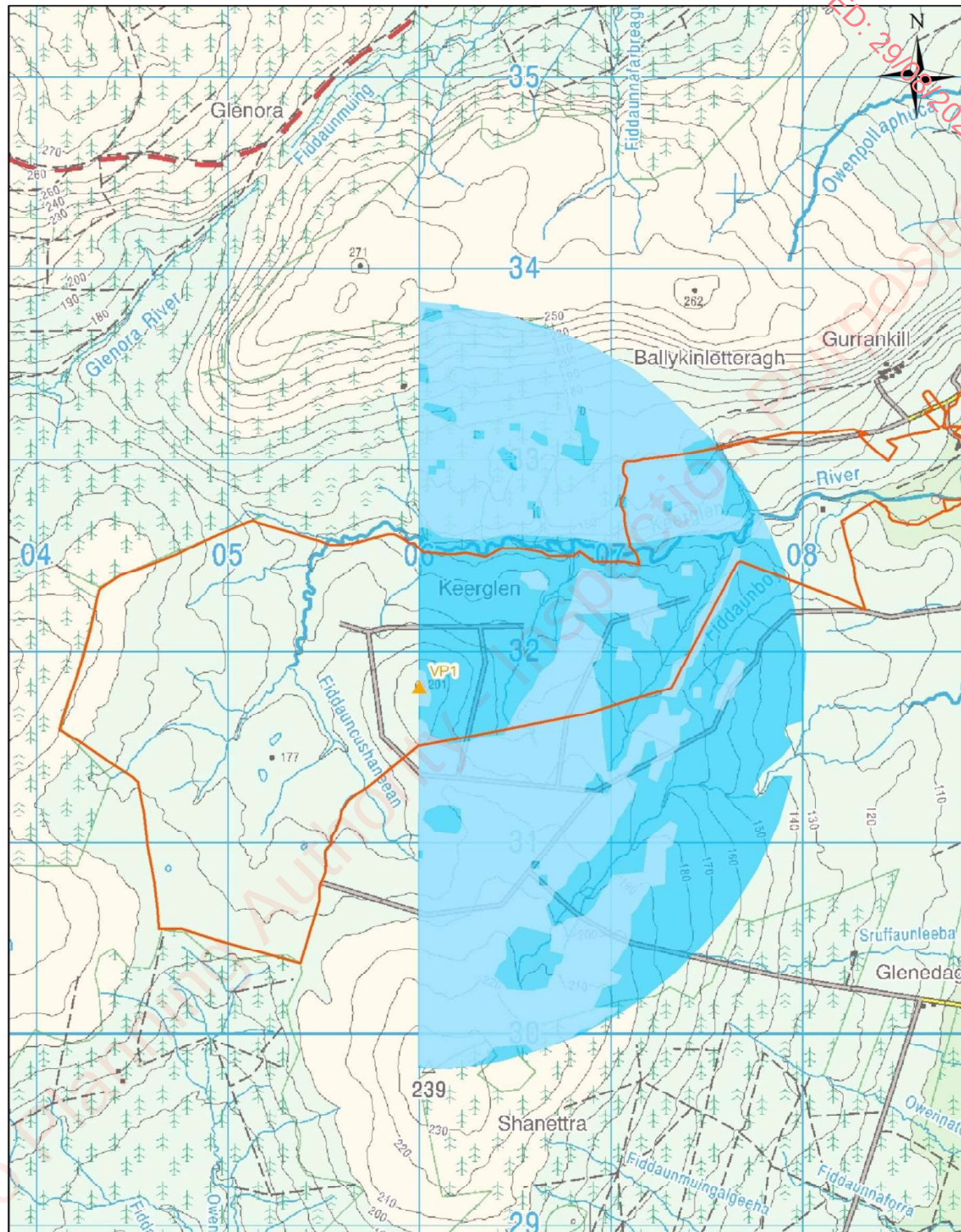
Breeding Merlin Survey

Merlin *Falco columbarius* breeding 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 in areas of suitable habitat. Three surveys were completed between April and June 2021. Focus was along the forest edges with open bog to one side. Figure 5.4 displays the location of the merlin survey transect, with details and results of surveys in Appendix 5.6.

Breeding Woodcock Surveys

Breeding season walkover surveys for woodcock were carried out at dusk on two dates in May/June, 2021. Transect no. 1 was part of the same transect as used for the merlin survey, *i.e.* along forest edge in the northwest sector of study area. Transect no. 2 was along the edge of the block of forestry which skirts the easternmost sector of the study 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 21.15 hrs and 00.15 hrs. Figure 5.5 displays the locations of the woodcock survey transects, with details of surveys in Appendix 5.6.



- ▲ VP Locations
- Site Boundary
- VP1 (0m)
- VP1 (20m)

0 0.2 0.4 0.8 Km

Project: Keerglen Wind Farm - Bird Surveys
Title: Viewshed Analysis
Drawn By: Wetland Surveys Ireland Ltd. for
Biosphere Environmental Services
Date: 10th of June 2024

Figure 5.2a: Location of Vantage Point no. 1 and associated viewshed

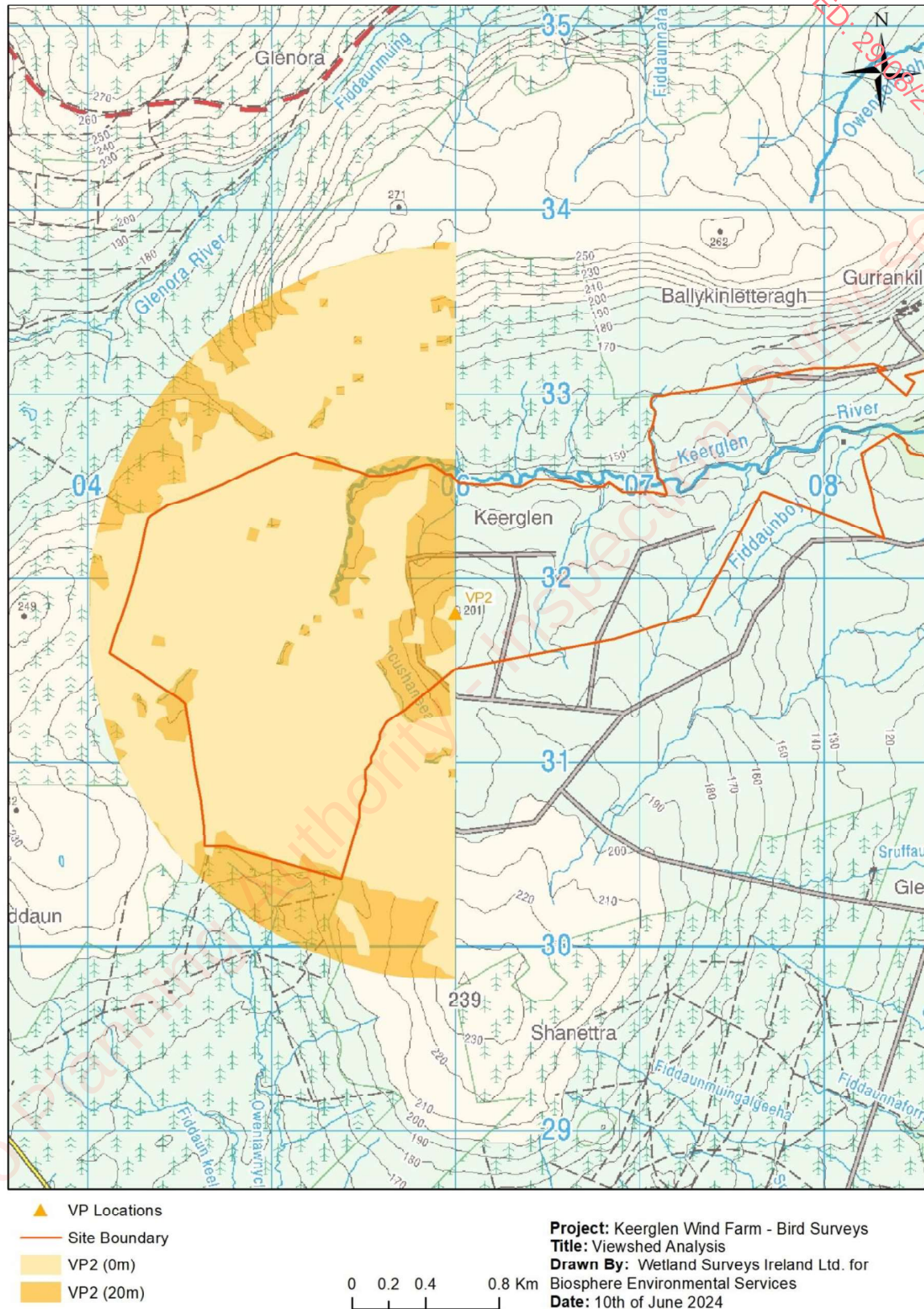
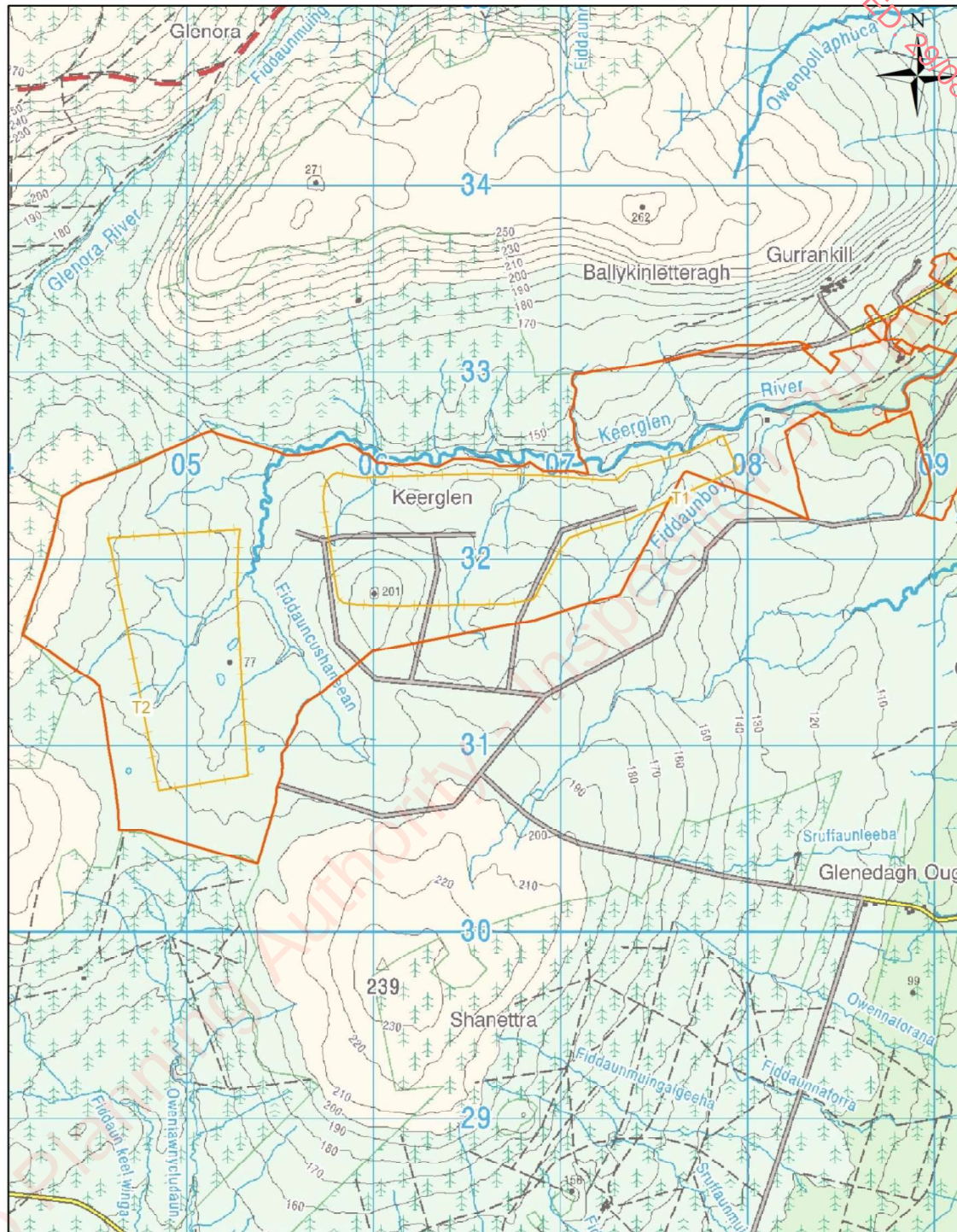


Figure 5.2b: Location of Vantage Point no. 2 and associated viewshed



Project: Keerglen Wind Farm - Bird Surveys
Title: Breeding and Wintering Transect Locations
Drawn By: Wetland Surveys Ireland Ltd. for
 Biosphere Environmental Services
Date: 12th of June 2024

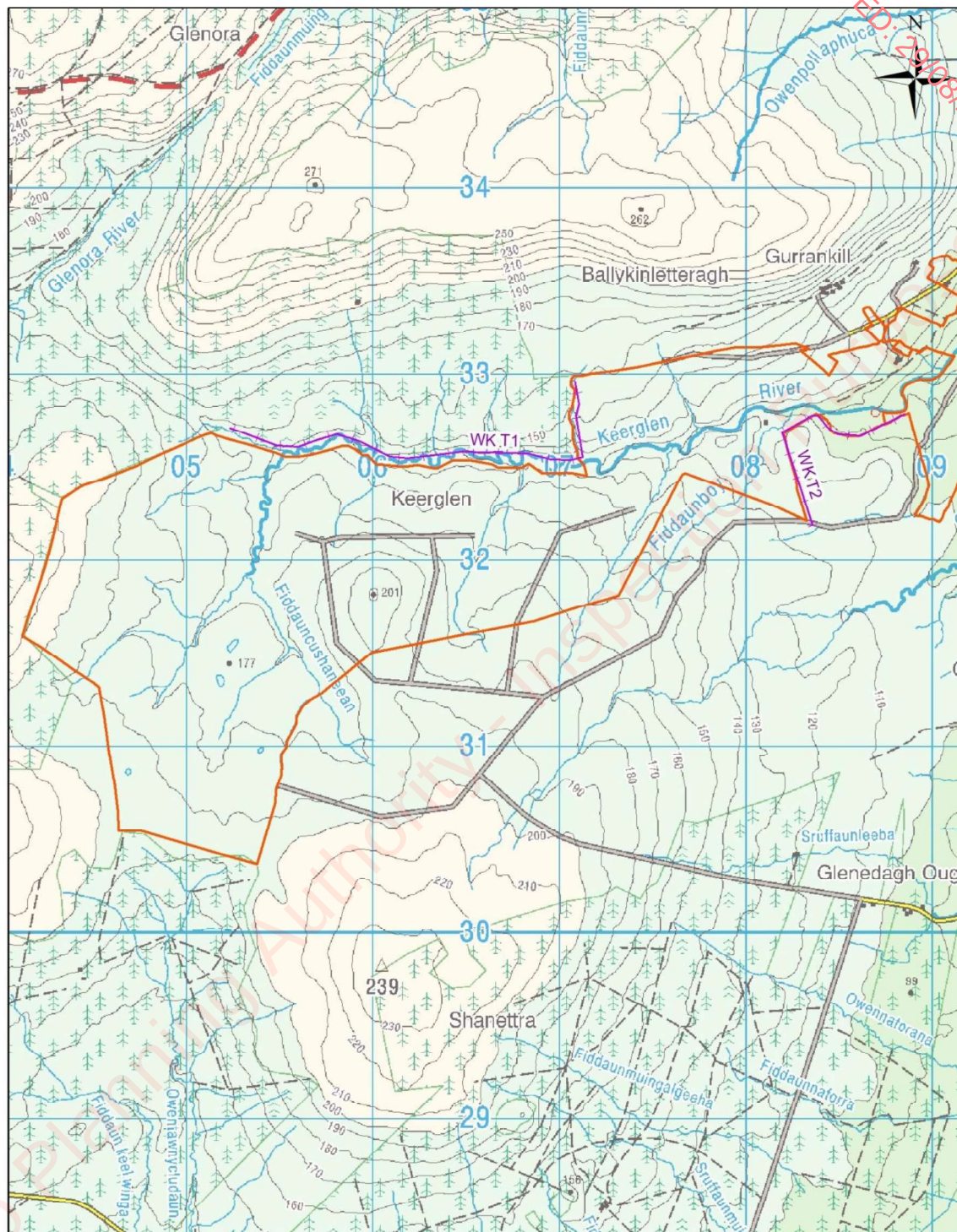
— Transect
 — Site Boundary

0 0.2 0.4 0.8 Km

Figure 5.3: Locations of transects for breeding and wintering bird surveys



14



— Woodcock transect
— Site Boundary

0 0.2 0.4 0.8 Km

Project: Keerglen Wind Farm - Bird Surveys
Title: Woodcock Transect Locations
Drawn By: Wetland Surveys Ireland Ltd. for Biosphere Environmental Services
Date: 12th of June 2024

Figure 5.5: Locations of transects for breeding Woodcock survey

Red Grouse Survey

A red grouse survey was carried out on the Wind Farm Site on 26th March 2020 (under licence no. 011/2020). This followed standard methodology (Bibby *et al.* 2000; BWI, 2007; Cummins *et al.* 2010), using the line transect method with tape lure. The transects used are shown in **Figure 5.6**. The survey report, with full details, is presented in **Appendix 5.7**. Survey was carried out by Jackie Hunt and Mick Hogan, both experienced in red grouse survey techniques. Weather on the day was cloudy with light to moderate winds, good visibility and no rain.

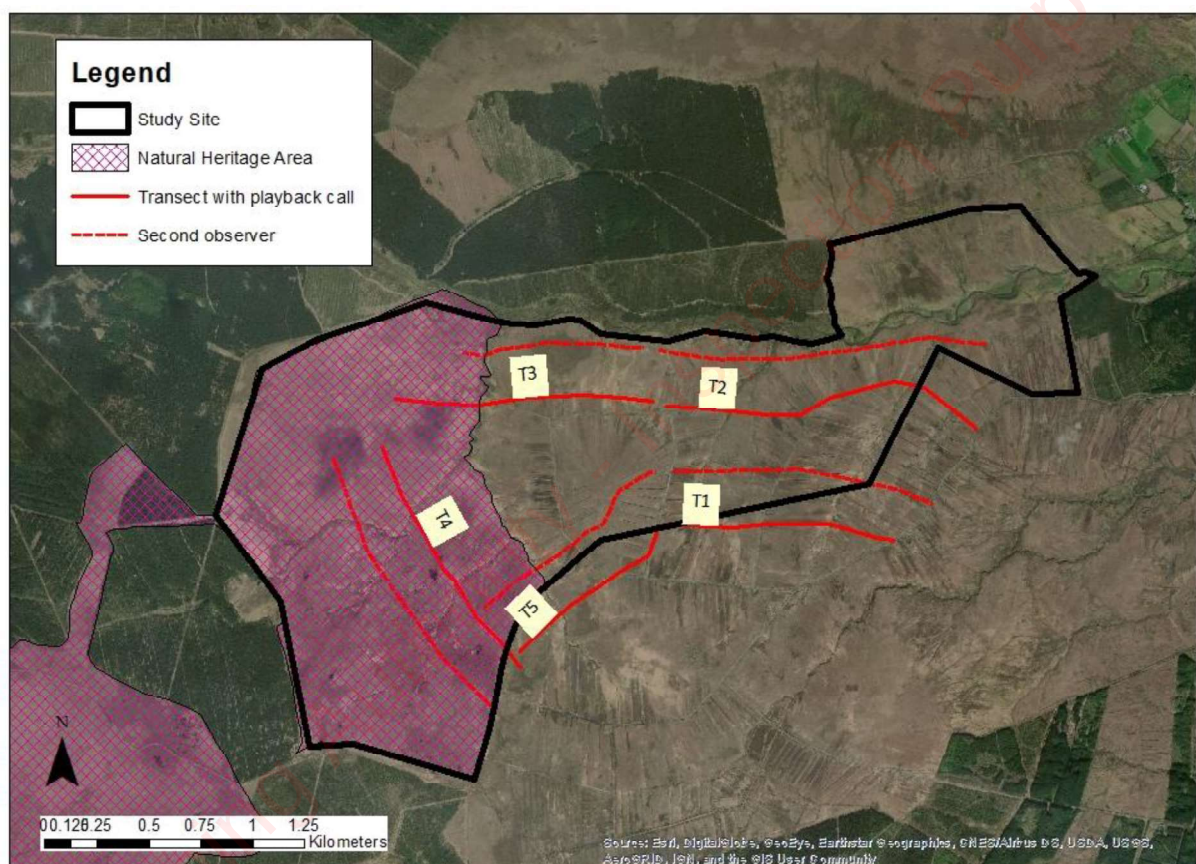


Figure 5.6: Route of Red Grouse transect survey at Keerglen, March 2020. Transects walked with megaphone playback only shown (second observer walked parallel transect at 250 m).

Hinterland Surveys

Hinterland surveys were undertaken to establish populations of target species that could potentially cross the wind farm site whilst moving to and from roosting and/or feeding grounds.

Reflecting the physical setting of the Site, the hinterland surveys focused on areas of open bog within a distance of approximately 3 km of the Site (distances beyond 2-3 km are outside the usual ZOI for most

species). Such areas potentially could support sensitive species such as breeding merlin and golden plover, as well as wintering species such as golden plover and hen harrier and possibly Greenland white-fronted goose.

Four areas were surveyed as follows (see Figure 5.7):

- H1 = Ballykinletteragh 262 m high point (grid ref. G 074338): an area of open blanket bog to north of site, with the Owenpollaphuca River valley to the northeast (designated as part of Glenamoy Bog Complex SAC) and the Glenora/Glencullen River valley to the west;
- H2 = Cluddaun Bog (grid ref. G025305): an area of open blanket bog that is west of Site and part of the Ummerantarry Bog NHA.
- H3 = Srahmeen Bog (grid ref. G014344): an extensive area of open blanket bog that is west of Site and part of the Bellacorick Bog Complex SAC.
- H4 = Inagh Bog (grid ref. G015345): an extensive area of open blanket bog that is north-west of Site and designated as the Inagh Bog NHA.

At each of these four locations, two survey sessions were carried out in each of the 2020 and 2021 summer seasons and two sessions in each of the 2020-2021 and 2021-2022 winter seasons, *i.e.* total of 4 surveys in summer and 4 surveys in winter. On each survey at the locations, approximately three hours was spent observing and scanning the habitats for bird activity. Some local walk-over surveys were also conducted.

Details (dates etc) of the hinterland surveys are given in Appendix 5.8, with results presented in Appendix 5.9.



● Hinterland VP Locations
— Site Boundary

0 0.325 0.65 1.3 Km

Project: Keerglen Wind Farm - Bird Surveys
Title: Hinterland Vantage Point Locations
Drawn By: Wetland Surveys Ireland Ltd. for Biosphere Environmental Services
Date: 12th of June 2024

Figure 5.7: Hinterland Survey Locations

5.2.4 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, 2018).

5.2.5 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 impacts 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-listed¹ in Ireland under the relevant lists of Birds of Conservation Concern Ireland (BoCCI), *e.g.* Gilbert *et al.* 2021.
-

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.

¹ 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.

5.2.5.1 Assessing Impacts and the Significance of Effects

The terms impact and effect are defined by CIEEM (2018) as:

- Impact – Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow (CIEEM, 2018).
- Effect – Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow (CIEEM, 2018).

CIEEM (2018) 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, 2018).

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 EclA guidelines (CIEEM, 2018) 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.

5.3 Baseline Conditions

5.3.1 Data Presentation

There follows a summary of observations from the various surveys carried out between 2019 and 2022. Full details and results for the surveys are presented in Appendices 5.1 – 5.9.

An overview of the status for each species of conservation importance based on the surveys from 2019 to 2021 is then presented.

5.3.2 Flight Activity Surveys - Breeding Season

Sparrowhawk was a scarce species during the summer surveys, with only four records over the two years of survey. Two of the records, including a pair of circling birds on 27th April 2020, were over the forests to the north of the site where breeding is likely. One on-site record was of a male bird carrying a prey item, with another of a single bird hunting along the river corridor (just off-site).

Buzzard was recorded on five occasions during the summer surveys though most records were off-site and mainly associated with the forests to the north. One of these records (30th July 2019) was of a circling pair, while three interacting birds were recorded on 18th September 2020. There were two records of single birds flying over the bog in the extreme western sector of the study area.

A **Golden eagle** was observed over the site on 21st May 2020. The bird, which was a sub-adult (at least second calendar year), had extensive white on the tail feathers as well as some missing tail feathers and primary wing feathers. It was observed in the eastern sector of the site and landed on two occasions. It eventually flew north and could be seen circling in the far distance.

Kestrel was the most frequently recorded target species during the summer surveys. There were seven sightings during the 2019 vantage point watches, and four during the 2020 watches. All records were of single birds and involved both male and female birds. Most of the observations were of birds hunting. Much of the Wind Farm Site provides suitable foraging habitat for kestrel.

While there was no evidence of nesting by kestrel within the wind farm site (nor would nesting be expected due to the dominance of bog), the frequency of records suggests a breeding territory within a distance of probably 1-2 km of the Site.

Golden plover was a scarce species during the summer season vantage point activity surveys, with only three records over the two years of survey. A single bird which flew into the western sector of the site on 26th April 2019 was likely a local breeding bird. Two records on 26th and 28th August, involving flocks of 21 and 14 birds respectively, were post-breeding flocks.

A single **Great black-backed gull** was recorded flying eastwards through the site on 29th April 2019.

5.3.3 Flight Activity Surveys – Winter Season

Six target species were recorded within the survey area during the winter period.

Sparrowhawk was largely absent from the site during the main winter period. There were, however, three records (October & February) mostly associated with forests to the north and including a soaring pair (23rd February 2020).

Buzzard was also largely absent from the site area during the main winter period. A pair was recorded circling over the forest and westernmost part of bog on 30th March 2020, with a pair also recorded over the forest on 13th March 2021. There were two records of birds flying across the Site.

There were single records of **Peregrine** in each of the winters (2nd December 2019 & 24th November 2020) both involving birds flying over the site.

Kestrel was recorded on site in both winters though was relatively scarce, with only one record in the main winter period from December to February. Most of the records were of birds hunting on site.

Golden plover was scarce in winter 2019/20, with only two records (22nd October & 16th December). There was a series of records in winter 2020/21 between 26th January and 13th March, involving flocks of between 15 and 42 birds. All records were from the bog in the western sector of the study area (the NHA), with birds observed both in flight and on the bog.

There was one record of **Lesser black-backed gull** involving 2 adults flying westwards over the river valley on 20th March 2020.

5.3.4 Transect Surveys

The results of the transect surveys at the wind farm site are presented in Appendix 5.5.

Breeding birds

Meadow pipit (Red list) and skylark (Amber list) were the commonest species within the wind farm site, both breeding on the bog habitats throughout.

Golden plover was recorded in the western sector (NHA) in both summers, with two breeding territories present (see Figure 5.8). Both territories were occupied in 2019, while in appeared only territory GP2 was occupied in 2020.

Snipe, a Red-listed species, was recorded displaying (drumming) in both summers. It is expected that three breeding territories were present within the Site (see Figure 5.9). There was evidence of red grouse presence, both direct observations and signs (pellets), during the various summer surveys (see section 5.3.7 for detailed red grouse survey).

Other breeding species associated with the Site include blackbird, robin, wren, stonechat, wheatear and linnet. Swallows were recorded regularly feeding over the site and are expected to breed locally. Grey wagtail is likely to breed along the river though no nesting locations were recorded within the Site area during the surveys.

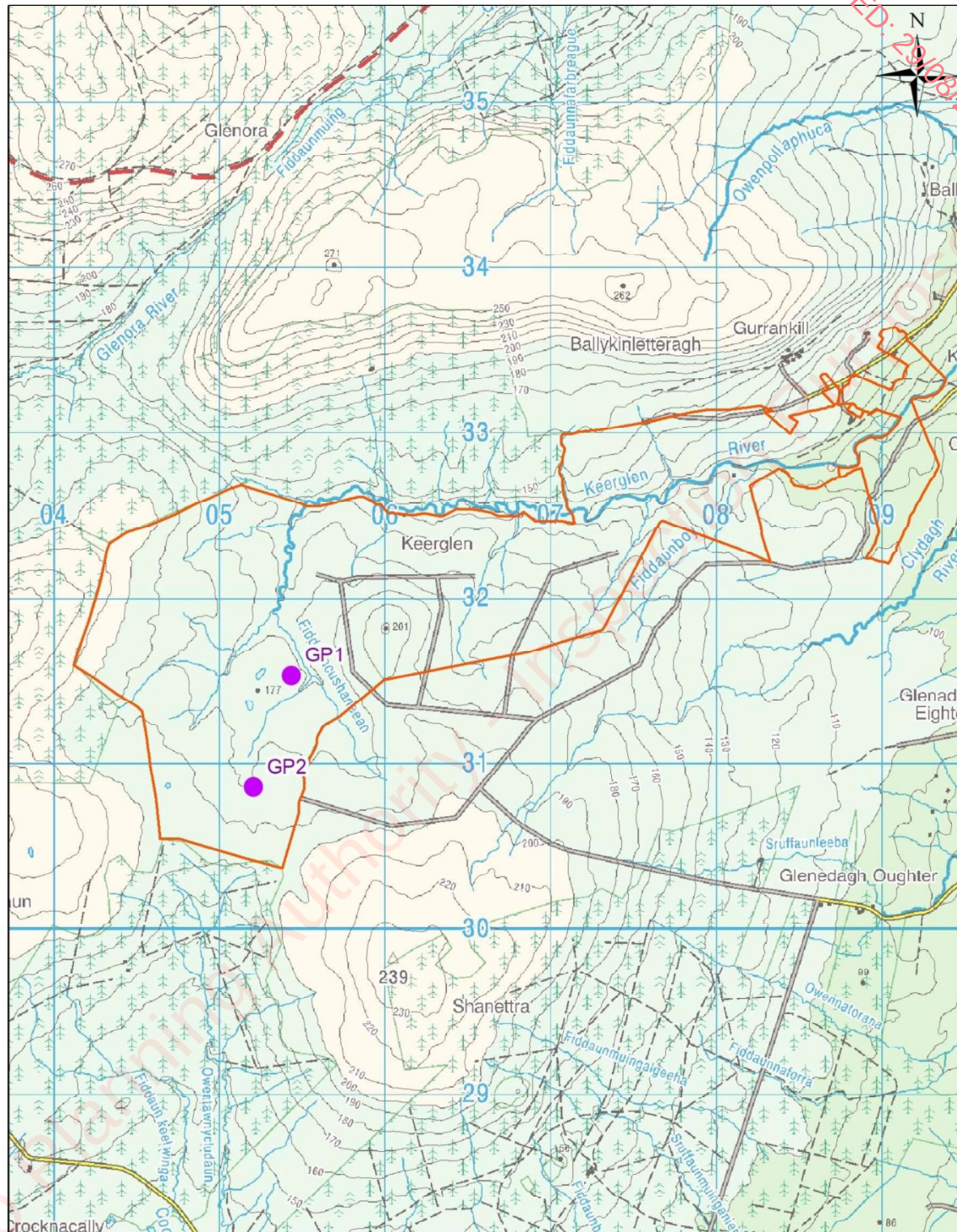
The adjoining conifer plantations support breeding species such as woodpigeon, coal tit, mistle thrush, song thrush, goldcrest, willow warbler and chaffinch (all seen and/or heard from transects).

Wintering birds

The Wind Farm Site was relatively quiet during winter with low levels of bird activity.

Meadow pipit, stonechat and wren were the principal passerine species which occurred within the bog habitats. Hooded crow and raven also had a presence on site throughout the winter.

Snipe was a fairly widespread species through the winter though most records involved single birds. There were two records of golden plover from the western bog area in winter 2019/20 involving one and four birds respectively. Red grouse is resident on site, with both observations and signs of their presence throughout the winter periods.

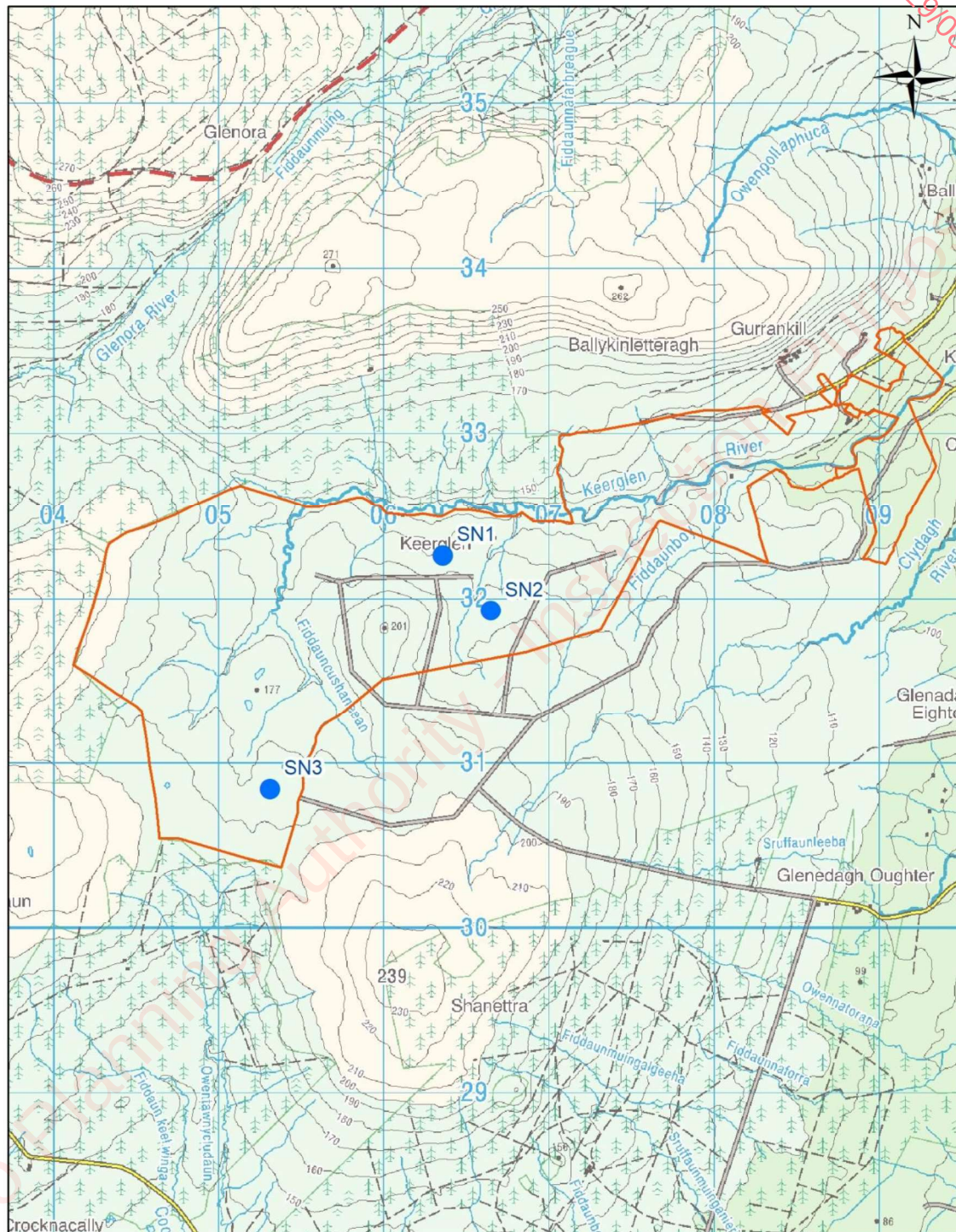


● Golden Plover Breeding Territories
 — Site Boundary

0 0.25 0.5 1 Km

Project: Keerglen Wind Farm - Bird Surveys
Title: Golden Plover Breeding Territories
Drawn By: Wetland Surveys Ireland Ltd. for Biosphere Environmental Services
Date: 14th of June 2024

Figure 5.8: Locations of estimated territories of golden plover



● Snipe Breeding Territories
— Site Boundary

0 0.25 0.5 1 Km

Project: Keerglen Wind Farm - Bird Surveys
Title: Snipe Breeding Territories
Drawn By: Wetland Surveys Ireland Ltd. for Biosphere Environmental Services
Date: 14th of June 2024

Figure 5.9: Locations of estimated territories of snipe

5.3.5 Merlin Survey

There was no evidence of the presence of breeding merlin within the wind farm study area during the merlin survey in 2021. However, the habitats within and around the site are generally considered suitable for merlin.

There was an observation of merlin on 25th June 2021 during a hinterland survey at Inagh Bog to the northwest of the Site. The bird (probable male) flew low across the bog (see species account in Section 5.3.9 below).

5.3.6 Woodcock Survey

There was no evidence of the presence of breeding woodcock within the wind farm study area during the woodcock surveys in 2021.

It is noted that there were several winter records of woodcock at dusk from within the wind farm site and also one record from along the local access road (see species account in section 5.3.9).

5.3.7 Red Grouse Survey

A detailed report on the red grouse survey in March 2020 is presented in Appendix 5.7.

The tape playback survey elicited ten responses (call back with/without flight) from male red grouse (see **Figure 5.10**). Signs of Red Grouse were recorded in two locations: at one location there was a paired roost and at another a single dropping. Both were considered to be old, *i.e.* present for more than 3 days.

While ten calls were elicited during the survey, consideration of the call locations together with observations during the field survey indicates that 6 territorial males were present in the survey area (see Figure 5.11). One of the territories was partly outside the blueline study area and one entirely outside.

The total survey area represents approximately 6 km². Based on six red grouse territories, this gives a density of one Red Grouse per km².

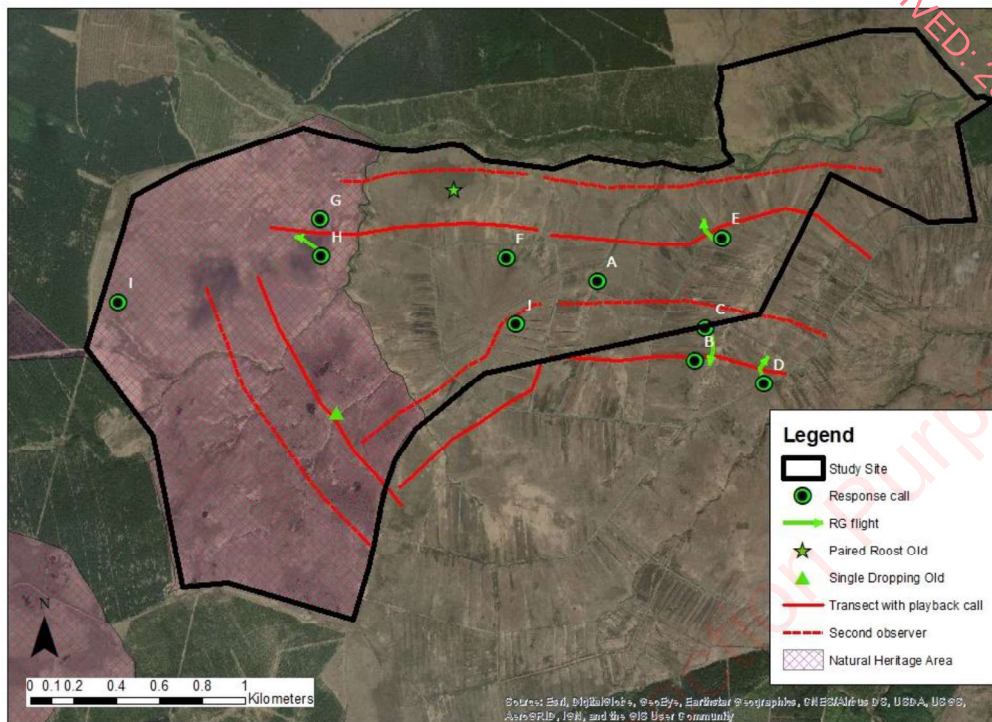


Figure 5.10: Red grouse results from tape playback survey, March 2020

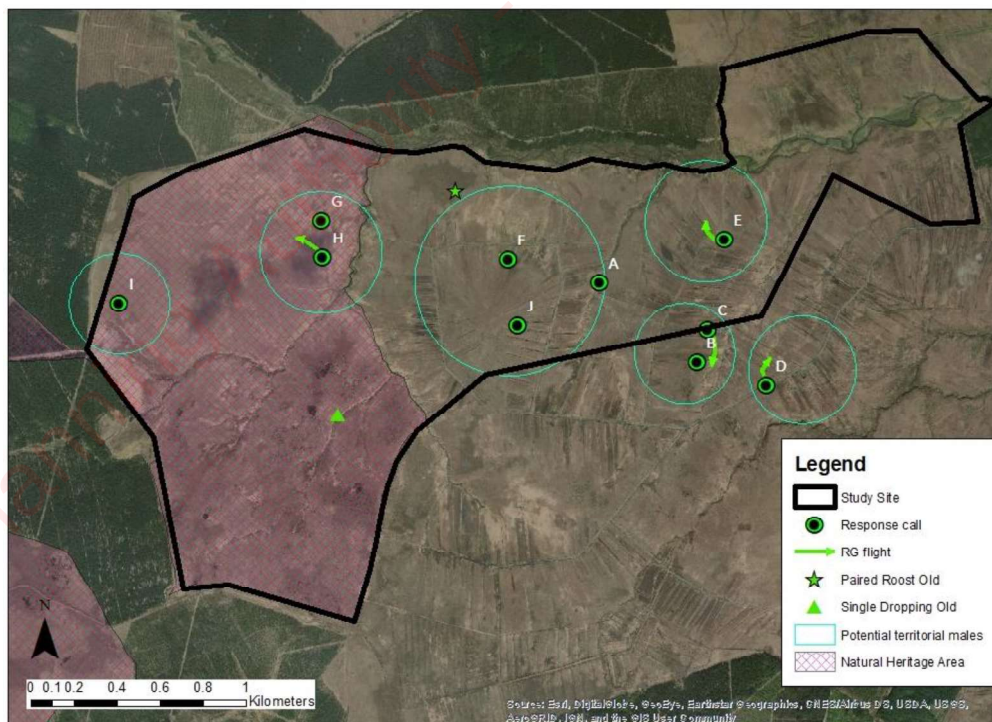


Figure 5.11: Red grouse survey – potential territorial males

5.3.8 Hinterland Surveys

Surveys for bird species of conservation importance were carried out at four locations within a 3-4 km radius of the wind farm study site. Results are given in the following sections.

Ballykinletteragh Bog

This is an extensive area of relatively intact blanket bog to the north of the wind farm study area, and includes a sector of the Glenamoy Bog Complex SAC. Part of the open bog adjoins conifer plantation.

Golden plover (1 territory) and red grouse were both recorded during the summer surveys, along with a hunting kestrel.

As with most bog areas, there were few birds present in winter, though a small flock of golden plover was observed on the bog on 29th November 2021.

Cluddaun Bog

This is an area of relatively intact blanket bog to the west of the wind farm study area. It is part of the Ummerantary Bog NHA, with conifer plantation separating it from the eastern sector (latter part of study area).

Snipe were recorded during the summer surveys, along with buzzard over the forests to the north.

Few birds were present in winter, with several snipe flushed during a walk-over of the bog.

Srahmeen Bog

This is a very extensive area of mostly intact blanket bog to the west of Cluddaun Bog and the wind farm Site. It is part of the Bellacorick Bog Complex SAC.

Golden plover (1-2 territories) was recorded in the summer surveys, along with red grouse and snipe.

In winter, a flock (15) of golden plover was observed on the bog on 29th November 2021. Red grouse was also flushed during a walk-over survey.

Inagh Bog

This is an extensive area of mostly intact blanket bog to the northwest of the wind farm study area (separated by extensive forestry). The site is designated as a NHA.

Golden plover (2 territories) was recorded in summer, along with red grouse. Of particular note was a merlin observed flying across the bog on 25th June 2021 - habitat is considered suitable for breeding merlin.

Snipe and red grouse were recorded in winter, along with a flock of 6 golden plover.

5.3.9 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 follows.

Table 5.1: Conservation status of species recorded within the study area of the proposed Keerglen Wind Farm.

Species	Annex I	Red list	Amber list	Green list
Sparrowhawk				Y
Golden eagle	Y	Y		
Buzzard				Y
Kestrel		Y		
**Merlin	Y		Y	
Peregrine	Y			Y
Red grouse		Y		
Golden plover	Y	Y		
Snipe		Y		
Woodcock		Y		
Lesser black-backed gull			Y	
Skylark			Y	
Swallow			Y	
Goldcrest			Y	
Willow warbler			Y	
Starling			Y	
Wheatear			Y	
Grey wagtail		Y		
Meadow pipit		Y		
Linnet			Y	

** Merlin was recorded only off-site during hinterland surveys

Sparrowhawk – Green List

Sparrowhawk was a scarce species within the study site, with most records from over the forests to the north of the site where breeding is likely.

While sparrowhawk, a woodland species, is not usually recorded on open bog, the river corridor with associated scrub provides useful hunting habitat for the species.

Golden Eagle – Red List; Annex I

There was one record of golden eagle within the study area on 21st May 2020. The bird was a sub-adult and after leaving the site continued northwards.

While no wing tags were observed on the bird, it is highly likely to be associated with the Golden Eagle Reintroduction Programme based in Co. Donegal. Since breeding first occurred in 2007, at least 20 chicks have been fledged. As immature birds wander widely throughout upland areas in Ireland, the observation of one at Keerglen is not unexpected.

Buzzard – Green List

Buzzard was a fairly scarce species within the study site, with most records from over the forests to the north of the site where breeding is likely.

The marginal areas of the study provide useful foraging habitat for the buzzard.

Merlin – Amber List; Annex I

There were no records of merlin at the wind farm site during the baseline vantage point surveys or the dedicated merlin survey in 2021.

However, suitable breeding habitat for merlin exists within the wind farm site as well as in surrounding areas, as shown by a record of a merlin at Inagh Bog on 21st June 2021.

Peregrine – Green List; Annex I

There were two flight records of peregrine passing over the site.

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.

Kestrel – Red List

Kestrel was the most frequently encountered bird of prey, both in summer and winter, with individuals observed hunting actively within the site for the proposed wind farm, as well as in the hinterland areas.

The level of activity recorded for this species, as well as sightings from the off-site vantage points, is indicative of a breeding territory in the vicinity (likely 1-2 km distance) of the wind farm site.

Red grouse – Red List

Red grouse is resident within the wind farm site. The March 2020 baseline survey concluded that there was a minimum of six territorial red grouse males in the study area of the wind farm site. These were located mostly in areas dominated by cutover bog in the central sector of the wind farm site. With a survey area of approximately 6 km², this gives a density of 1 territorial red grouse per km².

Typical red grouse densities in Ireland were estimated to be 1.1 individuals per km² of suitable habitat. Densities in West Connaught are estimated at 0.64 males per km² (Cummins *et al.* 2010). The Owenduff/Nephin Complex SPA supports an extensive area of largely intact blanket bog and lies west of the study site. A systematic survey of red grouse was completed at this SPA in 2016 (McLoughlin & Hunt, 2016) and densities of 1.4-1.5 males per km² were recorded. The Keerglen survey indicates that red grouse densities are comparable to those nationally and regionally. Interestingly, the results indicate a higher density of red grouse within the cutover bog dominated habitat than in the intact blanket bog habitat (NHA component). More detailed consideration of the habitat present may explain this further, however it was noted during the survey that while the bog was severely degraded it retained a diversity of micro habitats or habitat features. Tall heather was present within the cutover bog and on the hill slope. In addition, the cutover bog is crossed by tracks with grit which would be used by grouse to aid digestion. It is likely that the diversity of habitat features meets more of the foraging and shelter requirements of red grouse than intact blanket bog, which can be quite homogenous.

In addition to the records from the wind farm site, red grouse was also recorded in the hinterland areas both in summer and winter.

Golden plover – Red List; Annex I

This Red-listed and Annex I species was recorded in both summer and winter during the various on-site surveys, as well as in the hinterland surveys.

The western sector of the study site (all part of Ummerantarry Bog NHA) supported 1-2 breeding territories (see Figure 5.8). The habitat here, wet blanket bog, is considered optimum for the species. Whether breeding was successful in either of the years is not known but predation is likely to be high due to the regular presence of hooded crows and red fox in the general area.

Golden plover was also recorded from the western sector of the study site in the winter surveys, with most of the records in October and March indicating migratory birds. Numbers were relatively low, involving flocks of between 15 and 42 birds. There was also an incidental record of c.70 golden plover circling over the site during the red grouse survey on 26th March 2020 (again, these would be migratory birds).

Golden plover was also recorded breeding in three of the four hinterland survey areas.

Snipe – Red List

Snipe breeds within the Wind Farm Site, with probably three territories (see Figure 5.9). The birds were associating with both blanket bog and cutover bog.

It is also a winter visitor throughout much of the site though in relatively small numbers (most records being of single birds flushed).

Snipe was also recorded breeding in two of the four the hinterland survey areas.

Woodcock – Red List

Woodcock is a winter visitor to the area of the wind farm site. There was no evidence of birds during the breeding season, and it is noted that woodcock is rare as a breeding species in north Mayo (Balmer *et al.* 2013).

The winter records were of single birds on 14th November 2019 and 24th January 2020, and three on 15th December 2019. All flew northwards from site into the conifer plantation to north of Keerglen River.

There was a further incidental record of two birds flushed along road c. 2 km from site on evening of 29th January 2020.

Lesser black-backed gull – Amber List

There was a single record of two adult birds flying westwards along the river corridor on 20th March 2020. These were likely migratory birds on way to breeding sites elsewhere in Co. Mayo.

Goldcrest – Amber List

A breeding species associated within the adjoining conifer plantations along the boundaries of the wind farm site. Can also occur on scrub along the trackways. Scarce in winter.

Skylark – Amber List

A widespread breeding species throughout the wind farm site. Largely absent in winter, returning breeding birds from March onwards.

Swallow – Amber List

Recorded feeding over the wind farm site regularly during summer. Expected to nest in local farm buildings.

Willow warbler - Amber List

A widespread breeding species within the local conifer plantations and in areas of scrub.

Starling – Amber List

Observed mainly in late summer and autumn when post breeding flocks form and visit the wind farm site. Mainly occurs in the low-lying areas in the eastern sector of Site. Probably breeds in local farm buildings.

Wheatear – Amber List

Passage migrant, mainly in spring. May breed locally.

Grey wagtail – Red List

Grey wagtail occurs along the Keerglen River. While breeding is expected, no nest sites were located. May nest downstream of site.

Meadow pipit – Red List

Meadow pipit is a widespread breeding bird throughout the wind farm site. Post-breeding flocks of up to 20 birds often seen in late summer and autumn. It is also present during winter though in relatively small numbers.

Linnet – Amber List

Breeds within the wind farm site (1-2 pairs). Mostly recorded along the marginal areas of the bog tracks. Scarce in winter.

5.3.10 Overview of Conservation Importance of the Wind Farm Study Area for Birds

The study area for the wind farm site, *i.e.* blue-line landowner boundary (see Figure 5.1), supports a number of bird species characteristic of peatland habitats.

Red grouse, a Red-list species, is resident within the wind farm site with an estimated six territorial males recorded (one partly and one entirely outside the blue-line boundary study area).

Golden plover (Red listed & Annex I species) breeds (1-2 territories) on the blanket bog in the western sector (part of NHA) of the site, with migratory and wintering birds also recorded.

Snipe, also Red-listed, breeds within the wind farm site (c. 3 territories), and is also a regular winter visitor.

A further Red-list species, woodcock, occurs in winter.

Kestrel (Red list) hunts within the wind farm site through the year, while meadow pipit (Red list) breeds widely throughout the Wind Farm Site.

While the occurrence of an immature golden eagle is of note, immature birds travel widely from the Donegal stronghold and the occasional record anywhere in north Mayo would be expected.

While Merlin (Annex I species) was not recorded in the study area in any of the surveys, suitable habitat exists on site and there was one record of a bird during a hinterland survey at Inagh Bog (c.3 km distance from Keerglen).

Grey wagtail (Red list) has a presence on the Keerglen River, while a range of Amber-listed species breed within the Wind Farm Site, including skylark (widespread), willow warbler and linnet.

Overall, on the basis of providing breeding, foraging and roosting habitat for several Annex I listed and Red-listed species, the bog habitat (intact and cutaway) within the wind farm site is rated as of County Importance for birds (following NRA 2009 Guidance). The area of grassland, mostly wet grassland, in the easternmost part of site is of relatively low importance for birds and is rated as Local Importance.

5.4 Assessment of Effects

5.4.1 Do Nothing Impact

Without the proposed wind farm development proceeding, it is expected that the existing main land uses on the wind farm site, namely peat cutting and sheep/cattle grazing, will continue. It is possible that parts of the site could be used for commercial forestry in the future.

The value of the wind farm site for birds would be expected to remain fairly similar as at present though any increase in the intensity of peat cutting and grazing could be detrimental to the overall quality of the bog habitat which could affect species such as breeding red grouse and snipe. Planting of commercial forestry within the site would likely have negative effects for birds.

5.4.2 Construction Phase Potential Effects

5.4.2.1 Effects due to Habitat Loss

As described in Chapter 6 Biodiversity, the construction of the wind farm will result in the permanent loss of approximately 7.62 ha of cutover bog and 1.89 ha of upland blanket bog. In addition, small areas of wet heath and poor fen and flush will be lost, as well as areas which are a mosaic of these habitats. Overall, an estimated 10.13 ha of peatland type habitats will be lost due to the construction of the proposed wind farm.

It is noted that the redline boundary for the proposed development completely avoids the intact blanket bog in western sector of study area, which is within an NHA and supports breeding golden plover.

The blanket bog and cutover bog habitats affected by wind farm construction provide suitable habitat for breeding red grouse and snipe. A further Red-listed species, kestrel, hunts over the bog habitats within the study area, with meadow pipit (Red-listed) a widespread species throughout the study area.

While any loss of bog habitat is of some significance for associated bird species, the loss of c.10 ha of mostly cutover bog accounts for a relatively low proportion of the total bog habitat within the Wind Farm study area, and all the existing bird species on site are likely to retain viable populations within the Wind Farm Site Blue-line Landowner Boundary. The significance for the breeding red grouse and snipe populations within the site by the loss of bog habitat is rated as an Adverse Moderate Effect of Permanent duration.

From the perspective of birds, the effect by the minor loss of other habitats, including wet grassland and scrub, as a result of the proposed development is rated as Not Significant.

5.4.2.2 Disturbance to Birds During Construction

The construction phase for the project is anticipated to last approximately 15 months. In this period, on-site activities, including 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 which are identified as of high conservation importance at the Keerglen Wind Farm Site, three were recorded breeding within 500 m of where construction works will occur – these are red grouse, golden plover and snipe.

For these three species, potential disturbance effects are considered below. It is noted that pre-construction surveys will be undertaken for these species to confirm the breeding status in the area by the time of construction (see Section 5.6.1.1).

It is considered that non-breeding species recorded on the wind farm site during the baseline surveys from 2019 to 2021, including kestrel, golden plover, snipe and woodcock, would not be affected significantly by disturbance from construction works.

Red grouse

The baseline 2020 red grouse survey recorded six territorial males within the Wind Farm Site study area. At least two of these territories are within 500 m of the construction zone.

Red grouse is not considered in the NatureScot (2022) review of disturbance distances in birds. However, in a review of monitoring data from wind farms located in upland habitats in the UK, Pearce-Higgins *et al.* (2012) reported that densities of red grouse were significantly reduced at wind farms during construction but that the densities had recovered by the first-year post-construction. Owing to the high conservation status of red grouse and their sensitivity to disturbance, a precautionary buffer zone of 500 m is recommended.

From the above analysis, it is considered that the construction of the wind farm would likely have a potential disturbance effect on breeding red grouse within a distance of possibly up to 500 m – this is rated as an Adverse Significant Effect of Short-term duration. Due to the high conservation status of red grouse, mitigation will be undertaken to reduce the significance of this likely effect on breeding red grouse (see Section 5.5.1.1).

Golden plover

The intact blanket bog in the western sector of the wind farm study area supports breeding golden plover, with two territories recorded during the baseline surveys. One of the territories (GP 1 - see **Figure 5.8**) was within 500 m of WTG 2 and WTG 3.

Birds on passage or in winter may also land on the bog habitat though there is no evidence of birds regularly using the bogs in winter or on passage.

Golden plover 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 200-500 m suggested for both breeding and non-breeding birds.

From the above analysis, it is considered that the construction of the wind farm is likely to have a potential disturbance effect on breeding golden plover within a distance of possibly up to 500 m from the construction area – this is rated as an Adverse Significant Effect of Short-term duration. Due to the high conservation status of golden plover, and particularly considering the evidence of recent decline in the breeding population on bogs elsewhere in Co. Mayo (such as within the Slieve Fyagh SAC - see Birch 2018), a pre-construction survey will be carried out in all suitable breeding habitat for golden plover within at least a distance of 500 m from the required construction area and, as required, mitigation will be undertaken to reduce the significance of this potential effect on breeding birds (see section 5.5.1.1).

It is considered unlikely that construction works would have effects on birds landing on the bog in winter or during migration seasons as in these seasons the birds are highly mobile and tend to settle only for short periods in any one particular location – significance of potential effect rated as Imperceptible or Not significant.

Snipe

The baseline surveys within the wind farm site study area recorded three snipe breeding territories. One territory (SN 1 - see Figure 5.9) was within approximately 100-200 m of WTG 5, while territory SN 2 was within approximately 200 m of WGT 6. The third territory is within the NHA and more than 500 m from any works area.

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 5.5.1.1).

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

5.4.2.3 Nest Damage or Destruction

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

This applies to all aspects of the Project, *i.e.*, the Wind Farm Site, the Underground Electricity Export Connection and Turbine Delivery Route.

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.

5.4.3 Operational Phase Potential Effects

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

1. displacement
2. collision
3. barrier effects

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

5.4.3.1 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 2017).

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:

Sparrowhawk

The baseline surveys showed that while sparrowhawk was scarce within the wind farm site it is expected to breed within the hinterland (1-2 km distance) of the wind farm site.

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 and over scrub, 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.

Golden eagle

While there was only one record of golden eagle passing through the site for the proposed wind farm during the baseline surveys, the habitat in the wider area is likely to be suitable for foraging by eagles.

In the review of upland raptors and wind farms, for golden eagle Madders and Whitfield (2006) tentatively rated this species as having a 'Low-High?' sensitivity to displacement. The uncertainty was due to contradictory results from up to four separate studies in the United States and Scotland.

As the bird recorded at Keerglen was an immature bird, an age class that wanders widely, individuals could be expected throughout much of north County Mayo and indeed western Ireland. There is no evidence to show that golden eagle is a regular species in the area of the Keerglen site.

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 while buzzard is scarce on the wind farm site it is expected to breed within the hinterland (1-2 km distance) of the wind farm site.

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 buzzards from local breeding pairs may forage in the area proposed for the wind farm at Keerglen, 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 (Pearce-Higgins *et al.*, 2012). 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 expected to occur in the local area (1-2 km distance). The species uses the Wind Farm Site for hunting purposes.

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.

For kestrel, the significance of a potential displacement effect is rated as Not significant.

Red grouse

The baseline surveys showed that red grouse is resident within the Wind Farm Site.

Pearce-Higgins *et al.* (2009) found no evidence of turbine avoidance by red grouse and, indeed, the occurrence of red grouse was found to be greater close to the tracks. Reasons for the association between grouse and wind farm tracks are likely to include: (i) supplies of grit on tracks which the birds need to ingest to aid digestion, and (ii) good growth of heather which often may be observed along the drier bog strips alongside the tracks. The present author has also observed grouse dust bathing on a dry track within a wind farm.

From the available information, it is considered that for red grouse the potential displacement effect due to the presence of turbines is Not significant, and the presence of the proposed development is likely to be a Neutral or even Positive effect of Moderate Significance in the Long-term.

Golden Plover

The baseline survey data showed that golden plover breeds on blanket bog which adjoins the wind farm site (*i.e.* within NHA) and is also a winter visitor and passage migrant within the area of the wind farm.

Pearce-Higgins *et al.* (2009) found that golden plover showed significant avoidance of turbines but that the avoidance was largely restricted to a distance of 200 m. However, in further review, Pearce-Higgins *et al.* (2012) found little evidence for consistent population declines in golden plover populations at wind farms sites. They note that populations may become habituated to operational wind farms, which is supported by the lack of decline in golden plover abundance at an upland wind farm over a 3-year period of operation (Douglas *et al.* 2011).

At the proposed development site, the closest distance of a turbine (WGT 2 & WGT 3) to a breeding territory is estimated at 400 m. Taking into account the difficulty of estimating territory size, on a precautionary basis a potential displacement effect on golden plover during the breeding season significance is recognised. However, this effect would be expected to decline with time as birds become habituated to the presence of the turbines. The significance of this adverse effect is rated as Slight.

It is considered unlikely that the presence of the wind farm would have adverse effects on golden plover landing on the local bog in winter or during migration seasons as in these seasons the birds are highly mobile and tend to settle only for short periods in any one particular location – significance of potential effect rated as Imperceptible or Not significant.

Snipe

Snipe was recorded both breeding and wintering within the wind farm site in the baseline surveys.

It is considered unlikely that the presence of the development would have significant adverse effects on snipe utilising the bog. 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 wintering snipe rated as Not significant.

During the breeding season when birds would be more sensitive to their surroundings, there may be some effect though the significance of this is unlikely to be high - rated as a Slight effect. Also, this effect would be expected to decline with time as birds become habituated to the presence of the turbines.

5.4.3.2 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 all scenarios within the range of turbine parameters proposed for the development as shown in **Table 5.2** below.

Table 5.2: Turbine Parameters

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	176 m to 180 m
Rotor Diameter	133 m to 150 m
Hub Height	105 m to 112 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 two years 2019-2021 (two breeding seasons and two winter seasons) at the wind farm site was used. There are four potential turbine models which may be used at the proposed wind farm. Because the final choice of turbine is not known at this stage, the worst-case scenario is assumed in the Collision Risk Assessment.

Two stages are involved in the model:

Stage 1: Vantage point observations of birds flying within the study area are used to calculate the number of birds likely to fly through areas swept by the proposed turbine blades.

Stage 2: Calculation of the probability of a bird strike occurring.

Full details of the collision risk modelling carried out for the project are given in Appendix 5.10.

At the wind farm site, the following four species recorded flights within the rotor sweep height and inside the 2 km arc of the selected vantage points during the Vantage Point surveys:

- Kestrel
- Golden plover
- Buzzard
- Sparrowhawk

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 low frequency of recorded flights, as follows:

- Golden eagle (1 record)
- Peregrine (2 records)
- Lesser black-backed gull (1 record)
- Great black-backed gull (1 record)

Due to the low frequency of recorded flights for the above four species, the collision risk can be assumed to be effectively zero and the species are excluded from further consideration.

The mean number of collisions predicted for the four species subject to analyses (with the application of avoidance rates) is summarised in Table 5.3.

Table 5.3: Summary of estimated mean number of collisions (with avoidance rates) predicted for key ornithological receptors over the lifetime of the Project.

Species	Mean no. of predicted collisions over lifetime of the Project (30 years)	Mean number of predicted collisions per year	One bird collision every 'x' years
Kestrel	5.838 birds	0.195	5.139 years
Golden plover	57.895 birds	1.93	0.518 years
Buzzard	5.820 birds	0.194	5.155 years
Sparrowhawk	2.131 birds	0.071	14.081 years

In the present assessment, the predicted collisions risks are relatively low for all the target species, with only golden plover being predicted to have more than 1 collision per year.

For **sparrowhawk**, the estimated collision rate (0.071 birds per year) is negligible and such a loss would not be significant in the context of the local, county or national populations. Taking into account the favourable conservation status of sparrowhawk (Green-list), the significance of collision risk is rated as Not Significant

The estimated collision rate was similar for **kestrel** (0.195 birds per year) and **buzzard** (0.194 birds per year).

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. While the predicted collision rate is low in the context of the estimated national population of 13,500 birds (Lewis *et al.* 2019), considering the high conservation status of the species, the significance of collision risk is rated as a 'Long-term Slight Negative effect.

For buzzard, the size of the bird and its tendency to fly relatively low and within the potential collision risk zone makes buzzard prone to collision. Watson *et al.* (2018) identify *Buteo* species, including *Buteo buteo*, as showing high risk of collision globally. In Ireland, however, buzzard has a favourable conservation status, which limits the potential for ecologically significant effects to result at the population level. Taking into account the favourable conservation status of buzzard (Green-list), the significance of collision risk is rated as Not Significant.

Golden plover had an estimated collision risk of 1.93 birds per year or 57.89 birds over the lifetime of the project. It is noted that most of the recorded flights were in the winter period. The two relevant flights in the summer period (April-September) involved flocks of 21 and 14 birds on 26th and 28th August 2020 respectively (see Appendix 5.2) and are considered to refer to migrating birds rather than local breeding pairs, which would typically have dispersed from the breeding grounds by early August.

It is noted that golden plover is polytypic, with two subspecies and four populations (Wetlands International). The population which breeds in Ireland is considered to be of the nominate subspecies *Pluvialis apricaria apricaria*, which breeds in northwest Europe and winters in west and southwest Europe (Crowe 2005). The majority of birds which winter in Ireland are immigrants of the *P. a. albifrons* population breeding in Iceland and the Faroes. In winter, golden plover is a widespread species throughout the island of Ireland, occurring largely on coastal wetlands such as estuaries, inland lakes and river valleys, as well as on agricultural lands. Small numbers may be found in upland bog areas

(such as at Keerglen). Thus, breeding and wintering golden plover in Ireland are of different populations, with the breeding population by far having the lower numbers.

Burke *et al.* (2019) gave the All-Ireland wintering population at 92,060 birds for period 2011-12 to 2015/16, which is a 43.6% decline since the 1994/95-1988/99 period. Wintering golden plover occur principally at two regular I-WeBS core sites in north County Mayo, Killala Bay and the Mullet Peninsula. The species occurs sparsely in winter throughout the extensive blanket bogs of north Mayo though these are not surveyed as part of the national wetland birds monitoring scheme (I-WeBS). The origin of the birds recorded in the Keerglen area in autumn and winter is not known, but sites holding 'regular' feeding and/or roosting populations of golden plover were not detected during the 24 months of baseline survey at Keerglen

While the predicted collision rate for golden plover (*i.e.* 1.93 birds per year) is relatively low in the context of the estimated All-Ireland wintering population, the significance of the effect of the collision risk is rated as 'Long-term Adverse Effect of Moderate Significance' due to the high conservation importance of the species (Annex I, Red-list) and the recent significant long-term decline in the wintering population.

5.4.3.3 Barrier Effect Due to Turbines

The potential impact 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.

Similarly, the proposed wind farm development site has not been identified as being located along a daily or seasonal commuting route between feeding and roost sites used by local birds such as gull species or waterfowl species.

It is considered that the proposed wind farm development would not cause any barrier effects to the movement of bird species either on migration or involved in local movements such as between feeding and roost sites.

5.4.3.4 Other Wind Farm Activities Impact

Other wind farm activities during the operational phase include turbine servicing and the maintenance and periodic upgrading of access tracks and substation inspection and maintenance.

Maintenance of 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 red grouse, kestrel and snipe.

Maintenance works at the turbines and the wind farm substation would not be expected to have any effects on local bird populations.

5.4.4 Decommissioning Phase Potential Effects

The wind turbines proposed as part of the proposed wind farm development are expected to have a lifespan of 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the proposed development will be decommissioned. The onsite substation will remain in place as it will be under the ownership of the ESB and will form a permanent part of the national electricity grid. A description of the decommissioning process is presented in the outline Decommissioning Plan contained in Appendix 3.4 of the EIAR.

During the decommissioning works there is a risk of disturbance and subsequent displacement to sensitive breeding species, such as red grouse, snipe and golden plover. Such disturbance effects would be potentially of similar significance, but shorter duration, as described in Section 5.4.2.2 above (Disturbance to birds), and would depend on the distribution of species at the time. As for the construction phase, appropriate mitigation will be implemented to ensure that disturbance to these species, as well as any other species which may have a high conservation status at the time of decommissioning, is minimised.

5.4.5 Potential Effects on Birds of the Hinterland

The hinterland surveys in summer and winter covered four areas of bog within a distance of 1-3 km of the Keerglen Site.

The results of these surveys (as described in Appendix 5.9) recorded a range of important bird species, including red grouse, golden plover and snipe, as well as a merlin in summer (possible territory).

As the locations of the four bog areas are separated from the Keerglen site by stands of commercial forestry or are situated at higher altitudes, it is not expected that the proposed development would have any potential for adverse effects on these local populations.

Also, there was no evidence of birds commuting from these areas to the site of the proposed wind farm.

Based on the hinterland surveys, it is concluded that the construction, operational and/or decommissioning phases of the proposed development does not have potential to have significant effects on any of bird species associated with the surrounding hinterland area.

5.4.6 Potential Effects on Designated Sites

The potential for effects on European sites designated for birds, *i.e.* Special Protection Areas, is assessed in detail in the accompanying NIS. The potential effects on nationally designated sites (NHAs or pNHAs) within a 5 km distance of the proposed wind farm site are considered in the following.

Natural Heritage Areas

Two NHAs occur within a 3 km distance of the proposed development, as follows:

- Ummerantarry Bog NHA (code 001570) – eastern component of the NHA adjoins the western end of the proposed development site. Site has breeding populations of golden plover, snipe and red grouse (as confirmed in present study).
- Inagh Bog NHA (code 002391) – located approximately 3 km to NW of proposed development site, with breeding populations of golden plover and red grouse. Also, merlin recorded in summer 2021 during present study.

Potential for disturbance exists to breeding golden plover, snipe and red grouse within the Ummerantarry Bog NHA as a result of construction works and to a lesser extent decommissioning disturbance (as discussed in Section 5.4.2.2 Disturbance to birds). Such disturbance is rated as an 'Adverse Significant Effect' of Short-term duration. Pre-construction surveys will be carried out in all suitable breeding habitat for these species within a distance of at least 500 m from the 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 within the NHA.

Due to the separation distance between the Keerglen site and the Inagh Bog NHA, and with extensive commercial forestry between the two locations, it is considered that there is no potential for effects on the birds of Inagh Bog NHA as a result of the proposed development.

Mitigation Measures

5.4.7 Construction Phase

5.4.7.1 Measures to Minimise Potential Disturbance to Sensitive Bird Species

The present assessment has identified the potential for significant disturbance effects on three breeding species of conservation importance as a result of the construction works (see Section 5.4.2.2). These species are red grouse, golden plover and snipe. Best available evidence has been reviewed and it is suggested that these species could be disturbed by construction works, including tree felling, at the following distances:

Red grouse	500 m
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Golden plover	500 m
Snipe	400 m

Should any of these species be recorded breeding within the given distances of the works area through confirmatory surveys before and/or during construction, a buffer zone (using above distances) shall 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, will apply from March to August (inclusive) and will ensure that the works will not have an adverse disturbance effect on the identified species of conservation importance recorded during the baseline surveys or in pre-construction surveys.

5.4.7.2 Measures to Minimise Potential Disturbance to Nesting Passerine Species

A range of passerine bird species breed within the site, including meadow pipit (Red-listed) and skylark (Amber-listed). As noted, (Section 5.4.2.3), disturbance to, or destruction of, active nests during construction activities could contravene Section 22 of the Wildlife Acts 1976 to 2021. Clearance of ground vegetation will take place outside of the bird breeding season (1st March – 31st August) to minimise the possibility of disturbance and destruction to occupied bird nests during the construction phase.

However, it is possible that some ground may still need to be cleared of vegetation during the breeding season or that previously cleared ground will have developed colonising vegetation which could attract nesting birds such as wren. Should these occurrences arise, the following protocol will be followed:

- The area will be surveyed by a qualified ecologist with ornithological experience 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 project, and where no alternative mitigation is available to prevent disturbance to the nest, the ecologist 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 would be consulted.

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

5.4.8 Operational Phase

A requirement for mitigation during the operational phase of the wind farm has not been identified.

However, should post construction monitoring identify an impact, such as higher collision rates than predicted for a particular species due perhaps to a change in population distribution since the baseline surveys, mitigation will be considered following best practice available at the time. This could involve the regular clearance of vegetation within the area of the identified turbine to discourage birds such as kestrel from hunting too close to the turbine.

5.4.9 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 project).

5.5 Monitoring

5.5.1.1 Pre-Construction Phase and Construction Phase

As noted in section 5.4.2.2, confirmatory breeding bird surveys focused on red grouse, golden plover and snipe, will take place in the spring/summer prior to construction to establish the breeding status and distribution within the wind farm site to a distance of at least 500 m from any works area. As the site has some potential for breeding merlin (though not recorded in the baseline surveys), this species will also be included in the confirmatory surveys.

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, with the red grouse survey following the tape lure method (under licence).

As noted in section 5.4.2.3, monitoring of all bird species will take place as required to identify locations of nesting birds during the construction phase should vegetation need to be removed.

5.5.1.2 Post-Construction Phase

Post-construction bird monitoring is required to establish possible effects on bird species as a result of the Project. 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 two 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 project (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 on bird populations within the wind farm site. Survey methodology will be similar to the transect methods employed for baseline summer and winter on-site EIAR surveys, which will allow a comparison of data to be made for each monitoring year.

For red grouse, a repeat of the pre-construction red grouse tape lure survey (under licence) will take place in Years 1, 2, 3 and 5 of operation. This will establish whether red grouse maintain a presence on site in the area of the wind farm infrastructure. Surveys will follow the standard methodology as used in the baseline EIAR survey.

Collision Searches

The wind farm project will provide an opportunity to gain baseline data on bird/turbine interactions 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 NatureScot 2021).

A standard plot size will be selected at each turbine location where search will occur. 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 will be combined with the bat carcass searches which will be carried out following guidance by NatureScot (2021). In addition, winter searches will be carried out for birds in each of the survey years owing to the occurrence of wintering golden plover in the area.

5.6 Cumulative Effects

There are 12 wind farm projects, ranging from pre-planning to operational stages, within a 20 km radius of the Keerglen Wind Farm Site (see Table 1.6 and Figure 10.12), comprising a total of 211 turbines (if all built).

The proposed Glenora project, comprising 22 turbines, is the most relevant as its located approximately 600 m north of Keerglen. This project is situated mainly within conifer plantation and no significant effects are predicted on birds due to habitat loss. A slight adverse effect for breeding buzzard, golden plover and snipe is predicted during the operational phase due to possible displacement or avoidance of suitable habitat as a result of the presence of turbines. The project is predicted to result in collision casualties for snipe, buzzard and kestrel, as well as wintering golden plover. However, it is not expected to have any adverse effect on migrating species or bird populations associated with sites in the hinterland, including Special Protection Areas. The Glenora EIAR notes that the breeding golden plover population associated with the Inagh Bog NHA could be displaced from suitable breeding habitat within a distance of up to 200 m from turbines during the operational phase (rated as a 'Slight adverse' effect). It is also noted that the Glenora project will not result in significant cumulative impacts on birds, in combination with other wind farm projects in the area.

Eight of the 12 projects (Bellacorick, Oweninny (3 phases), Sheskin South, ABO Sheskin, Gortnahurra & Kilsallagh) form a substantial cluster of turbines (if all built) to the southwest of the proposed development, varying in distance from approximately 7 km to 17 km from the proposed development site. These wind farms are mainly on cutaway bog and conifer plantation. Between this cluster of wind farms and the Proposed Development site the land use comprises almost entirely peatland habitats (much of which is designated) and commercial forestry.

The three Oweninny sites, as well as the Bellacorick Wind Farm (due to be decommissioned), comprise an area of approximately 5,000 ha and support a range of bird species of conservation importance, including breeding teal, red grouse, golden plover, dunlin, snipe, common sandpiper and common gull. Merlin is occasional on site and may breed. The Phase 3 area supports a winter hen harrier roost, with up to 6 birds recorded at times. The EIS for the Oweninny project (Phases 1 & 2) recommended mitigation to avoid or minimise disturbance to breeding birds during the Phase 1 and Phase 2 construction periods. With the various mitigation measures, it was considered that the Phase 1 and Phase 2 projects would not have any significant residual effects on breeding birds. The two Sheskin sites are largely in conifer plantation, though species such as kestrel and sparrowhawk occur within the area.

The Killala Community Wind Farm is close to the town of Killala and is not within an area of importance for birds. The Tirawley Wind Farm is spread over a large area of mostly agricultural land and commercial forestry to the east of the R315 and the southeast of Ballycastle.

Some of the other wind farm projects are built entirely or at least partly on peatland habitats (mostly cutaway bog) and a similar diversity of peatland bird species (inc. red grouse & breeding snipe) were

recorded during baseline surveys on these site as at the site for the proposed Keerglen Wind Farm. While significant effects on these species at the above-mentioned sites were not predicted (with mitigation in place), it can be assumed that suitable peatland habitat for bird species was lost during the construction phases. The contribution by the proposed Keerglen Wind Farm to a cumulative loss of bog habitat which supports important bird species is likely to be the main cumulative impact, though monitoring would be required at all the sites to determine if there had been any residual effects on the bird populations after construction.

5.7 Residual Effects of the Proposed Development

The principal residual effect on birds as a result of the proposed development is the loss of an estimated 10.13 ha of peatland habitat (mostly cutover bog), which will reduce the area of suitable habitat available for such species as red grouse and snipe (both Red-listed). The significance of this adverse effect is rated as 'Moderate' and of 'Permanent' duration.

In the absence of mitigation, the construction phase of the Wind Farm may result in disturbance to sensitive 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 red grouse, golden plover 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 or, at most, reduced to level of 'Not Significant' or at most 'Slight'.

Pre s associated with the project have potential to impact directly on any breeding birds within the works area. 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.

During the operational phase of the project, birds may show some avoidance of suitable habitat as a result of the presence of turbines. For breeding buzzard (off-site), golden plover and snipe, the effect is rated as a 'Slight' effect. However, it is noted that there is evidence that populations of species such as golden plover may become habituated to operational wind farms (Douglas *et al.* 2011).

During the operational phase of the project, birds will be at some risk of collision with turbines, with kestrel (summer and winter) and golden plover (wintering/passage populations) identified as the species at most risk. For kestrel, the significance of the risk is rated as a 'Slight adverse' effect of long-term duration, while for golden plover the significance of the risk is rated as a 'Moderate adverse' effect of long-term duration.

The baseline surveys did not identify any regular migration routes or local movements of wetland bird species, such as swans or geese, through the site. The proposed development is not expected to have any residual effect on migrating species or bird populations associated with sites in the hinterland.

The proposed development is not expected to have any residual cumulative effects on the Special Conservation Interests of any Special Protection Area (as detailed in the Natura Impact Statement).

The breeding golden plover population associated with the Ummerantarry Bog NHA could be displaced from suitable breeding habitat within a distance of at least 200 m from turbines during the operational phase - this is rated as a 'Slight adverse' effect. With time, some habituation to the presence of turbines is likely.

5.8 Conclusion

An assessment of effects on ornithology has been carried out at the wind farm site based on detailed survey information from 2019 to 2021. The core study area comprised the Blueline Landowner Boundary.

The Wind Farm Site supports species of conservation importance which are associated with peatland habitats – these include breeding red grouse, golden plover and snipe within the wind farm site study area. Kestrel hunts within the wind farm site. Overall, the wind farm site is rated as of County Importance for breeding birds.

The Underground Electricity Export Connection and Turbine Delivery route corridors are along local roads and there is no potential for the occurrence of bird species of significant conservation importance, *i.e.* Annex I listed or Red-listed, along these routes.

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

- Loss of approximately 10.13 ha of peatland habitat, mostly cutover bog, which is used by bird species of conservation importance. The significance of this is as a Moderate Adverse Effect of Permanent duration.
- Likely construction related disturbance to breeding red grouse, golden plover and snipe, which is rated as a Significant Adverse Effect of Short-term duration. With mitigation by establishment of a buffer zone where works will be restricted during the breeding season, effect avoided or reduced to Not Significant or at most Slight.
- 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 project, predicted collision rates for target species (mainly kestrel and golden plover) have been shown to range from Slight (kestrel) to Moderate (golden plover) significance.
- During the operational phase of the project, birds may show some avoidance of suitable habitat as a result of the presence of turbines. However, this effect is not likely to be Significant for any of the identified target species.
- 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 project is not expected to have any residual effect on migrating species (such as swans and geese) or local wetland bird populations.
- Adverse effects on the Special Conservation Interests of any Special Protection Area are not predicted (full details in accompanying NIS).
- The project includes rigorous ornithological monitoring (in line with best practice guidance) at pre-construction, construction, and operational phases.

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