

7 ORNITHOLOGY

7.1 INTRODUCTION

This Chapter considers the potential effects of the Project (see **Figure 1.2 in Chapter 1: Introduction**) on ornithology. It details the methods used to establish the bird species and populations present, 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.

The Development refers to all elements of the application for the construction of Inchamore Wind Farm (**Chapter 2: Project Description**). Where negative effects are predicted, the chapter identifies appropriate mitigation strategies therein. The assessment considers the potential effects during the following phases of the Development:

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

Common acronyms used throughout this EIAR can be found in **Appendix 1.2**. This chapter of the EIAR is supported by Figures provided in Volume III and by the following Appendix documents provided in Volume IV of this EIAR:

- **APPENDIX 7.1** - VP Summer 2017 - Survey Details
- **APPENDIX 7.2** - VP Winter 2017/2018 - Survey Details
- **APPENDIX 7.3** - Bird Survey VP Flight Line Data, 2017-2018
- **APPENDIX 7.4** - VP Summer 2018 - Survey Details
- **APPENDIX 7.5** - VP Winter 2018/2019 - Survey Details
- **APPENDIX 7.6** - Bird Survey VP Flight Line Data, 2018-2019
- **APPENDIX 7.7** - Additional Bird Survey Data, 2018 - 2019
- **APPENDIX 7.8** - VP Summer 2020 - Survey Details
- **APPENDIX 7.9** - VP Winter 2020/21 - Survey Details
- **APPENDIX 7.10** – Bird Survey VP Flight Line Data, Summer 2020 & Winter 20/21
- **APPENDIX 7.11** - Hinterland Survey Data, 2020 / 2021
- **APPENDIX 7.12** - VP Summer 2021 - Survey Details
- **APPENDIX 7.13** – Bird Survey VP Flight Line Data, Summer 2021
- **APPENDIX 7.14** - Hinterland Survey Data, Summer 2021

- **APPENDIX 7.15** - List of Birds recorded within Inchamore site during Surveys 2017-2021
- **APPENDIX 7.16** – Vantage Point Flight Line Maps for Surveys 2017 - 2021
- **APPENDIX 7.17** – Collision Risk Modelling Report
- **APPENDIX 7.18** – First Year Ornithological Surveys – Inchamore/Gortyrhilly Wind Farm Summer 2017 and Winter 2017 / 18. Prepared by Fehily Timoney & Company
- **APPENDIX 7.19** – Second Year of Ornithological Surveys – Inchamore/Gortyrhilly Wind Farm Summer 2018 and Winter 2018 / 19. Prepared by Fehily Timoney & Company
- **APPENDIX 7.20** – Baseline Ornithological Surveys – Inchamore Wind Farm Summer 2020 and Winter 2020/21. Prepared by Fehily Timoney & Company

A Construction and Environmental Management Plan (CEMP) is appended to the EIAR in **Appendix 2.1**. The CEMP includes an emergency spillage plan, a peat and spoil management plan, a surface water management plan, a traffic management plan and a waste management plan. The CEMP includes all of the construction phase mitigation proposed within the EIAR. A summary of the mitigation measures is included in **Appendix 17.1**.

7.1.1 Site Description

The Site is situated on the border of Counties Cork and Kerry and is approximately 5.9 km west of Ballyvourney. It is located within the Derrynasaggart Mountains and situated within a landscape dominated by agricultural land (mainly used for stock grazing), commercial forestry and bog and heath of varying quality.

The altitude of the site ranges from approximately 300 m to 460 m AOD, with the local peak of Knockwee at 461 m AOD. The primary soil type across the site is blanket peat, with some outcropping bedrock. The topography of the site varies, ranging from mostly gently to occasional steep inclinations. The Site is located within the Lee, Cork Harbour and Youghal Bay catchment. The site lies entirely within the Inchamore Stream sub-catchment. The natural streams within the Site are small 1st order tributaries which have high gradients and do not provide suitable habitat for fish or larger aquatic organisms.

The Grid Connection Route runs in an east to north-easterly direction from the Inchamore site to the existing Ballyvouskill 220kV substation (see **Figure 1.2 in Chapter 1: Introduction**).

Ecologically, the Site can be described as being dominated by conifer plantation (WD4 of Fossitt 2000). The unplanted area of the site is mostly wet heath (HH3), with areas of

upland blanket bog (PB2) and cutover bog (PB4). Other habitats represented within the Site are dry siliceous heath (HH1), exposed siliceous rock (ER1) and eroding/upland rivers (FW1). The grid connection route is almost entirely along forest tracks.

A full description of the Habitats, Flora and Fauna associated with the project site is presented in **Chapter 5: Biodiversity**.

7.1.2 Details of the Project

Permission is being sought by the Developer for the construction of 5 No. Wind Turbines, an on-site substation and all ancillary works and works along the turbine delivery route. Details of the Project are given in **Chapter 2: Project Description**.

7.1.3 Purpose of this Chapter

- To describe the baseline data collection and assessment methods used;
- To summarise the baseline ecological conditions;
- To identify and describe all potentially significant ecological effects 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 ecological 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 biodiversity and the legal and policy implications;
- To identify appropriate enhancement measures and how these will be delivered; and
- To set out the requirements for post-construction monitoring.

7.1.4 Project Team

The chapter has been prepared by Dr Brian Madden of BioSphere Environmental Services. The baseline ornithology surveys between 2017 and 2020 were carried out by Fehily Timoney ecologists. Baseline surveys in April and May 2021 were carried out by BioSphere Environmental Services.

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 botanical surveys and 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 has been involved in baseline bird surveys on the Bord na Móna cutaway bogs since 2014 and carries out winter and summer bird surveys. Joe carried out baseline ornithological surveys for the project.

Aidan Duggan has more than 30 years of bird surveying experience in Ireland and abroad and is an active member of the Cork branch of Birdwatch Ireland. Aidan has worked on a variety of projects throughout Ireland and is proficient in Vantage Point surveys, Transect Surveys, Hinterland surveys, merlin surveys and red grouse surveys. Clients include Fehily Timoney & Co. Consultants, BioSphere Environmental Services, and Kelleher Ecology Services. Aidan carried out baseline ornithological surveys for the project.

7.2 METHODS

7.2.1 Study area

The principal study area was the actual Redline boundary for the site of the Development. However, this extended to a distance of approximately 10 km from the Site 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 also included the route for the underground grid connection cable though site surveys were not carried out along this route.

7.2.2 Field Surveys

Baseline field surveys reported here were carried out between April 2017 and June 2021. A detailed methodology for all surveys is provided in **Appendices 7.18 & 7.19** and is briefly summarised here. The surveys carried out comprised the following:

- Flight Activity (Vantage Point) Surveys
- Breeding Moorland/Wader Survey;
- Breeding & Winter Bird Transect Survey;

- Hinterland Survey;
- Merlin Survey
- Red grouse Survey

Flight activity (vantage point) surveys

Flight activity surveys were carried out by Fehily Timoney & Company over a 24-month period from April 2017 to March 2019 following the methods described in NatureScot 2017 Guidelines (formerly SNH). Further Vantage Point surveys were carried out at the proposed Development site during the period May 2020 to May 2021.

The locations of the vantage points used (no. 3) are given in **Table 7.1**, with the locations and viewsheds shown in **Figure 7.1**.

Table 7.1: Grid References for VP locations used at the proposed Inchamore Wind Farm

Vantage Point	Location (ITM)
VP1	512600 578973
VP2	512393 578592
VP3	514385 579799

The main purposes of vantage point survey watches are to collect data on *target species* that will enable estimates to be made of:

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

In line with recommended best practice (Scottish Natural Heritage 2017, Band *et al.* 2007), viewshed analysis was undertaken using ARCMAP 10.3, to calculate a theoretical zone of visibility from each vantage point.

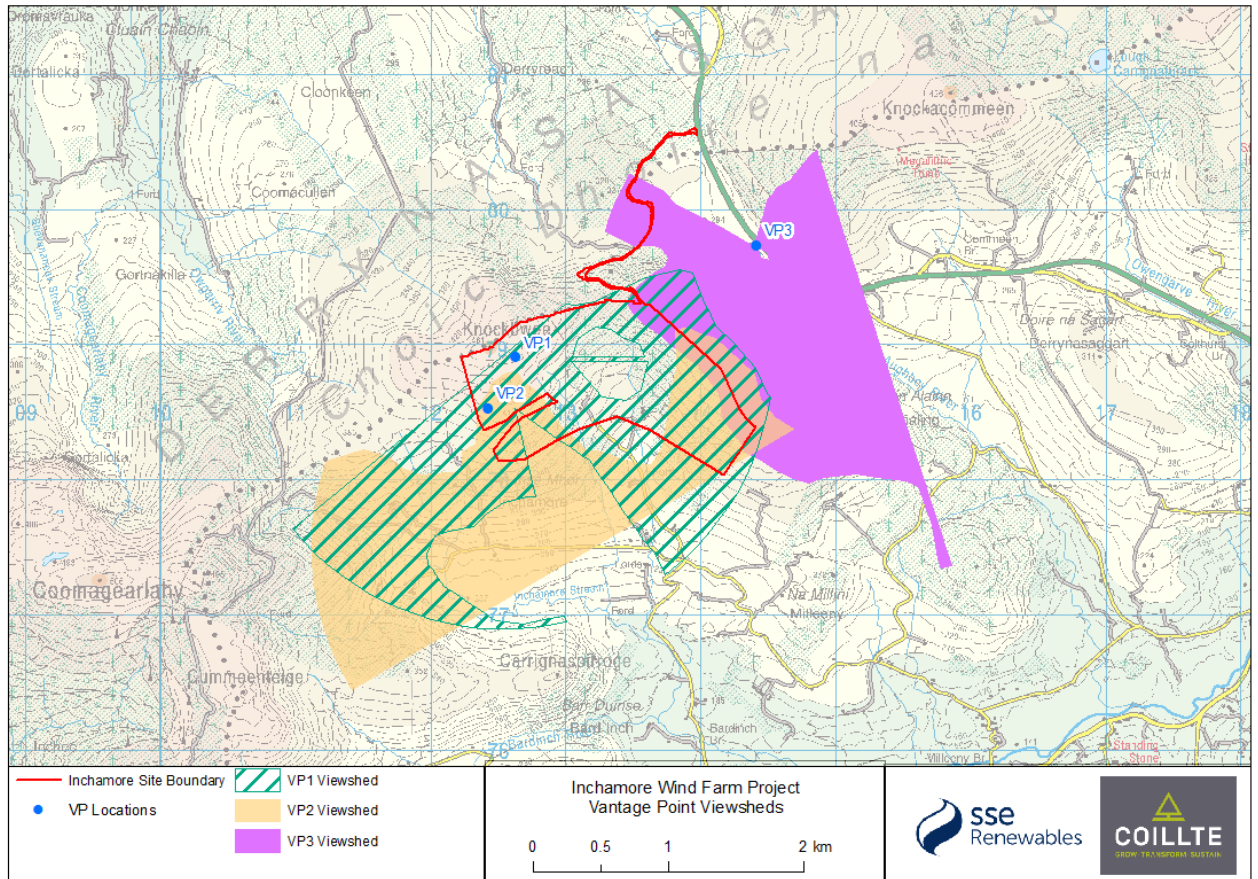


Figure 7.1: Locations of Vantage Points and associated viewsheds.

Following Scottish Natural Heritage guidance, watches were conducted to sample diurnal, crepuscular and nocturnal activity of target species. The method of observing was via constant search effort mostly through binoculars and/or a telescope. Data recorded included flight activity of target species (flight height, duration, directionality) in addition to metrics such as flock size and time of observation. Flight activity was annotated onto field maps.

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 2017 to March 2019 inclusive. The watches comprised 2 x 3 hour sessions at each VP every month. The proportion of survey time that activity was recorded inside and outside (up to 2 km) the Site Boundary 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.

Breeding Wader Surveys

Survey transects to assess the presence of moorland breeding bird species, and especially waders, were completed in 2017 (May-July), 2018 (May-June) and 2021 (April-May). Breeding birds were surveyed using methodology of the breeding wader survey and breeding moorland survey, following Bibby *et al.* (2000) and Gilbert *et al.* (1998). A series of transects were carried out from east to west within the open bog habitats of the site and adjoining area (see **Figure 7.2**).

All species encountered (seen or heard) on the transect were recorded and their abundance noted. Survey details are given in **Appendices 7.18 & 7.19**.

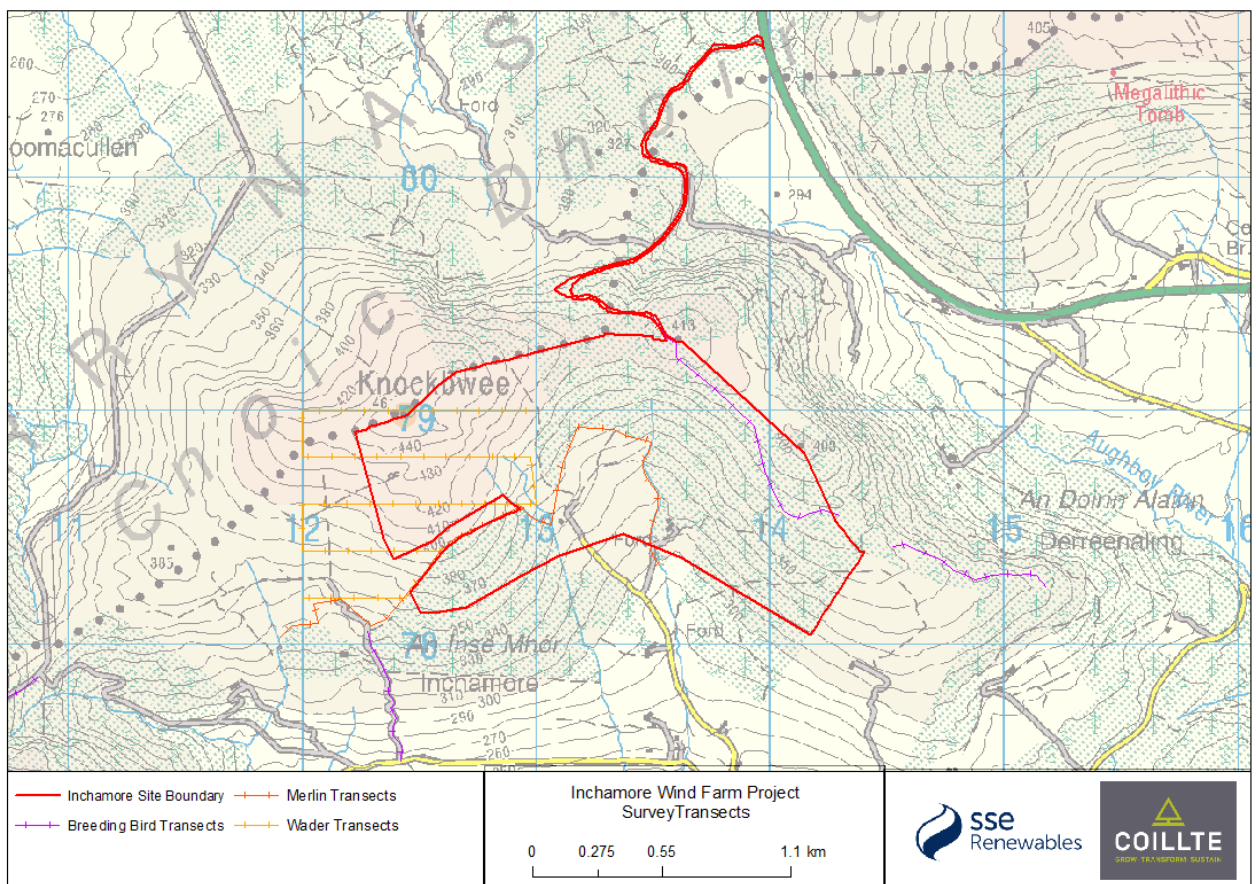


Figure 7.2: Locations of breeding bird, wader and merlin transects.

Hinterland Surveys

Hinterland surveys were undertaken to establish populations of target species that could potentially cross the Site of the proposed wind farm whilst moving to and from roosting and feeding grounds. Target species included raptors, waders, geese, swans and wildfowl. Survey methodology followed that of Bibby *et al.* (2000). Surveys were carried out in suitable wetland habitats over a distance of approximately 10 km radius from the Site.

Surveys were carried out from October 2017 to March 2019 and from May 2020 to May 2021. The sites surveyed are listed below, with locations of sites shown in **Figure 7.3**.

- Lough Nabuddoga
- Inchigeelagh
- Grousemount
- Gearagh
- Lough Allua
- Sillahertane Windfarm entrance
- Lee Valley
- Ballyvourney North
- Ballyvourney South
- Gortyrhilly
- Gougane Barra
- Kilgarvan North
- Roughty River
- Toon Valley/Killeens

Hinterland I-WeBS style surveys were carried out following a 'look-see' methodology as outlined in BirdWatch Ireland/NPWS's counter manual¹. Full details of the surveys are given in **Appendices 7.18 & 7.19**.

Breeding and Wintering Bird Transect Surveys

Breeding bird transect surveys were carried out in 2017, 2018 and 2020. The method utilised was based on the British Trust for Ornithology Breeding Bird Survey (Bibby *et al.*, 2000). A total of 3 no. c. 1 kilometre transects were selected and centred on different habitats present within the subject site or in adjoining areas (within 500 m of site Redline boundary) (see **Figure 7.2**). Birds were counted over two visits, each timed to coincide with the early part of the breeding season (April to mid-May) and later part of the season (mid-May to late June) with visits at least four weeks apart. Surveyors recorded all birds seen or heard as they walked methodically along the transect routes. Birds were noted in four distance categories, measured at right angles to the transect line (within 25 m, between 25m-100m and over 100m from the transect line) and those seen in flight only. Recording birds in distance bands gives a measure of bird detectability and allows relative population

¹ <https://birdwatchireland.ie/app/uploads/2019/03/IWeBS-Counter-Manual.pdf>. Accessed 26/06/2021.

*Location approximate – hen harrier roost counts conducted at numerous points in vicinity – locations withheld due to sensitivity.

densities to be estimated if required (BTO, 2018). Full details of the breeding bird transect surveys are presented in **Appendices 7.18, 7.19 & 7.20**.

The winter transect survey followed the same routes as the breeding surveys, with details given in **Appendices 7.18, 7.19 & 7.20**.

Merlin Survey

Merlin *Falco columbarius* surveys were carried out in order to assess the presence of the species within the proposed development site. Survey methods followed Gilbert *et al.* (1998), with use of transects. Four visits of potential merlin habitat were completed between May and July 2017, while three visits were completed between May and July 2018, and two in April and May 2021. Potential habitat types included areas of moorland, forestry plantation edges and young conifer plantation. Within all suitable areas within the subject site, signs of presence of merlin were recorded. **Figure 7.2** displays the location of the merlin survey transect, with details of surveys in **Appendices 7.18 & 7.19**.

Red Grouse Survey

A Red grouse (*Lagopus lagopus*) survey was carried out in February 2019 (under licence no. 27/2019). This followed standard methodology (Bibby, C. J. *et al.*, 2000; BWI, 2007; Cummins, S. *et al.*, 2010), using the line transect method with tape lures across sample each 1 km² survey squares. The survey locations and transects for the red grouse surveys are shown in **Figure 7.4**. Survey details are presented in **Appendix 7.19**.

7.2.3 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).

7.2.4 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).

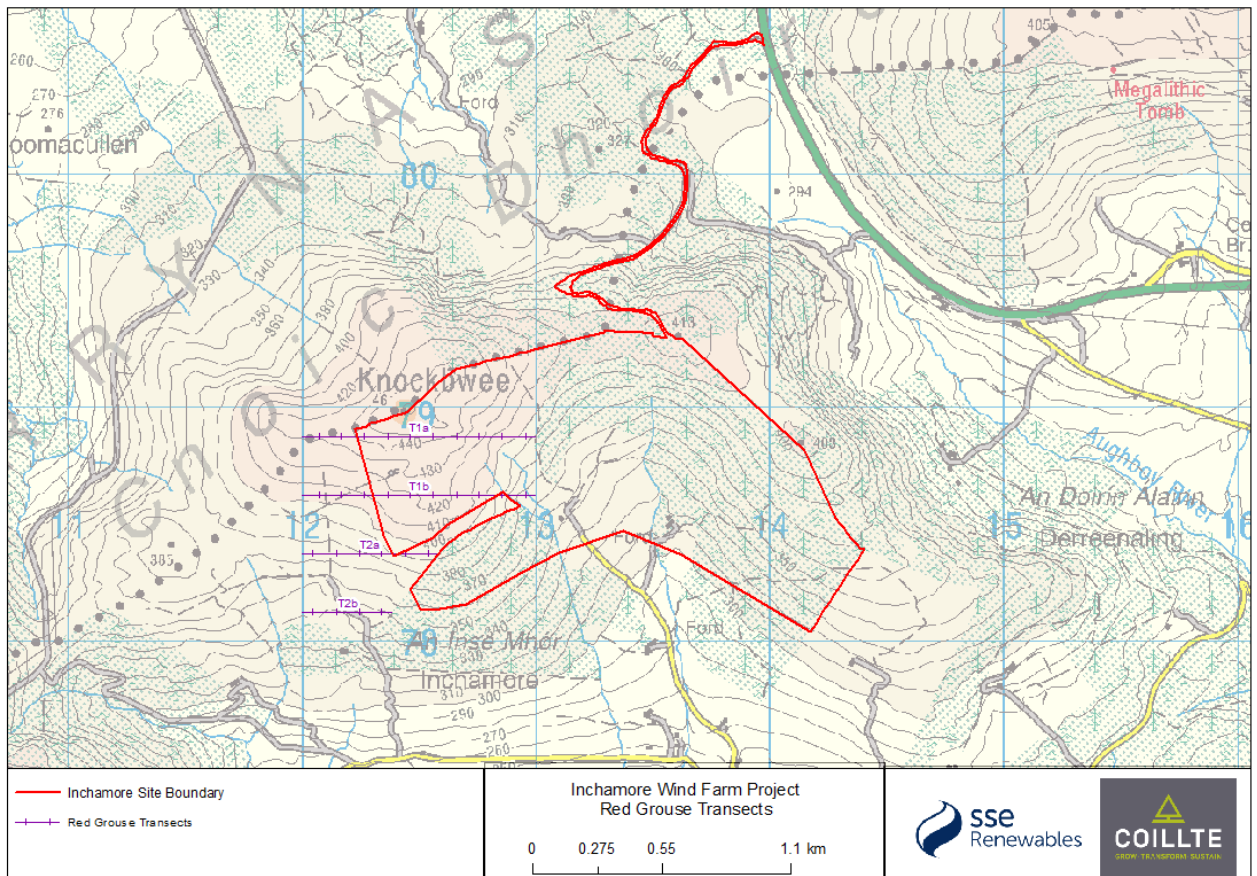


Figure 7.4: Locations of Red Grouse transects.

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-listed² 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.

7.2.4.1 *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

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

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.

7.3 BASELINE CONDITIONS

7.3.1 Data Presentation

There follows a summary of observations from the various surveys between 2017 and 2021. Data for the species recorded during the surveys are presented in **Appendices 7.1 – 7.14**. Flight lines are shown for each target species recorded during vantage point surveys in **Appendix 7.16**.

An overview of the status on site for each species of conservation importance based on the surveys from 2017 to 2021 is then presented.

7.3.2 Flight Activity Surveys - Breeding Season

Kestrel was the most frequently recorded target species during the summer surveys. There were concentrations of observations in the south-west sector of the site and to the north-east (most outside of Redline boundary). The majority of records were of single birds hunting or flying and involved both male and female birds. While there was no evidence of nesting within the site, the frequency of records, including several of two birds together, suggests breeding territories to the west and east of the site (outside of the Redline boundary).

Sparrowhawk was a relatively scarce species during the surveys, with records in summers 2017, 2020 and 2021. All observations were of single birds most of which were engaged in hunting. Several of the records were off-site, with some close to VP 3 location at c.700 m from the Redline Boundary. There was no evidence of breeding behaviour within the Site.

On 20th July 2018, a sighting of a **merlin** was made from VP 3 over forestry approximately 500 m to the east of the Redline Boundary. This was the only sighting during the vantage point surveys.

Single **peregrines** were observed on 19th April 2017 and on 11th September 2018. Both records were in the western sector of the site. There are no known peregrine breeding territories within the vicinity of the proposed wind farm. [It is noted that a pair of peregrines was recorded over site on 28th February 2021 – as peregrine is an early breeder, this would have been an active pair]

There was one record of **hen harrier** from within the south-western sector of the site on 27th September 2018. The bird (a ringtail) was observed flying in an eastward direction over

bog and forestry. Also, a male hen harrier had been recorded approximately 2 km southwest of the Redline Boundary of the site on 6th July 2018. There was no evidence of breeding by hen harrier within at least a 2 km distance of the site.

Buzzard was recorded on one occasion, on 27th September 2018. The record involved a bird flying south-eastwards over the western sector of the site. Buzzard is considered a scarce species in the area.

7.3.3 Flight Activity Surveys – Non-Breeding Season

Kestrel was recorded both on and off site in each of the three winter survey periods. The species is expected to be resident in the area and at times hunts within the study site.

Sparrowhawk was observed in winter 2017/18 and 2020/21. Both records involved single birds hunting off-site (near VP3 location).

Merlin was recorded on one occasion in winter 2017/18 – a bird flew over open ground to the south of VP3 location (off-site) on 15th November 2017.

A pair of **peregrines** was observed flying westwards from the area of the VP1 location on 28th February 2021. In addition, a peregrine was recorded approximately 1.5 km southwest of the Redline boundary of the Site on 17th October 2018.

Hen harrier was recorded within and around the site as follows:

- In winter 2017/18, there were six records though only one flightline was partly within the site (over bog/heath in westernmost sector). The other records were within a distance of approximately 500 m of the Redline boundary of the site. It is certain that at least two birds were involved (male and a ringtail) though possibly more. The records were between the 22nd January and 21st March 2018. In addition, single birds were observed approximately 3.5 km to the southwest of the site on 20th November 2017 and 1 km south of the site and on 22nd January 2018.
- In winter 2018/19, there were three records of single birds involving a male and female between 11th October 2018 and 16th January 2019. Two of the records within the western sector of the site and the third less than 500 m north-east of the Redline boundary.

From the pattern of records, it is considered that Hen Harrier is an occasional winter visitor to the site and its environs. There was no evidence to indicate that Hen Harriers roost within the site or within at least a 1 km distance of the Redline boundary.,.

There was a single observation of **white-tailed eagle** during each of the 2017/18 and 2018/19 winters. Whilst neither record was from within the Red-line boundary of the project, both were within a 1 km distance, as follows:

- On 22nd January 2018, a juvenile was observed circling approximately 500 m west of the Redline boundary of the Site.
- On 18th December 2018, a juvenile with a wing tag was observed approximately 1 km to the west of the Redline boundary of the site.

The observers considered that both records may have been of the same individual. No observations within or surrounding the redline boundary have been recorded in the surveys completed since 2018.

Golden plover was recorded from within the site in each of the three winter surveys. The records were largely from over the bog and heath habitats in the western sector of the site and over the area of bog to the west of that.

- In winter 2017/18 there was a total of 36 observations, with flock size ranging up to 40 birds. Most of the records were of birds in flight, though some involved birds roosting on the open bog and heath.
- In winter 2018/19, there was a similar pattern with a total of 17 observations and flock size ranging up to 49 birds. Again, birds were observed roosting on the open bog and heath on some occasions.
- In winter 2020/21, there were two records as well as a bird heard but not seen. The records were of a single bird and a flock of 25, and were from the north-west sector of the site.

7.3.4 Breeding Wader Surveys

There were no wader species recorded breeding on the Development site during the various moorland surveys (see **Appendix 7.7**).

7.3.5 Merlin Surveys

Signs of **merlin** presence were recorded on 25th May 2017 during a merlin transect survey (see **Table 7.2**) – these involved the recording of droppings and feathers from within the site and of pellets at a location approximately 500 m from the Redline boundary. In July 2017, a possible record of a bird calling from forestry near VP 1 was made. While no sightings were made of birds in 2017, the evidence indicate an active territory was present.

On 30th April 2018, a merlin was sighted over open bog/heath in the western sector of the site during a moorland transect survey. On 20th July 2018, a sighting of a merlin was made over forestry approximately 500 m to the east of the Redline boundary of the site. Earlier in July, there were two sightings of merlin approximately 2 km to the south-west of the site. As in 2017, it would appear that there was an active merlin territory in the vicinity of the site during the 2018 season.

There was no evidence of the presence of breeding merlin in the area during the (albeit limited) surveys in 2020 and 2021.

Table 7.2 Merlin Transect Survey, 25th May 2017 – Indicator signs.

Date	Sign	Location	Notes
25/05/2017	Pellet	51.9483744, -9.2809656	Pellets found at location & several more nearby
25/05/2017	Feathers	51.9539560 -9.2648599	Feathers found
25/05/2017	Droppings	51.9528344 -9.2666969	Droppings on rocks

7.3.6 Red Grouse Surveys

The red grouse survey in February 2019 recorded flying birds, a calling bird and feathers (see **Appendix 7.7**). This confirms the presence of at least one territory on the unplanted bog and heath in the western sector of the Site. In addition, grouse were flushed from within the site during the habitat surveys.

7.3.7 Transect Surveys

The results of the transect surveys at Inchamore for the period summer 2017 to winter 2020 are presented in **Appendices 7.18, 7.19 and 7.20**.

Meadow pipit (Red list) was a widespread breeding species on the bog and heath habitats within the Site. The species was also present in winter though in lower numbers. A further Red-listed species, grey wagtail, was considered to be breeding on the larger watercourses within the site.

Amber-listed species recorded during the breeding surveys were goldcrest, skylark, swallow, wheatear, willow warbler, starling and linnet. These species are expected to breed on site or at least in the surrounding areas and use the Site for feeding.

The site is relatively quiet in winter, though the Red-listed species meadow pipit and snipe were recorded in the bog and heath habitats. Other species recorded during winter included goldcrest and linnet.

7.3.8 Hinterland Breeding Bird Searches

For site-specific hinterland survey results see **Appendices 7.7, 7.11 and 7.14.**

During the summer season, 52 bird species were recorded in total across hinterland surveys including 23 target species. Of the target species recorded, three are Red-listed (dunlin, kestrel, and snipe). Little egret, peregrine, ruff and whooper swan, which are listed on Annex I of the Birds Directive, were also recorded.

White-tailed eagle was recorded on five occasions during hinterland surveys. These observations, all in 2018, were noted at the Sillahertane Wind Farm and Grousemount area. Three of the five observations concerned a sub-adult in its primary moulting stage. These observations occurred on 11th July, 22nd August and 13th September 2018. The remaining two observations consisted of a single individual being mobbed on the 10th & 24th May 2018. These observations show that while white-tailed eagle is rare in the vicinity of the Inchamore Site and has not been recorded since 2018, the species has a presence in the wider area.

The target species were recorded at three principal hinterland sites: the Gearagh, Gougane Barra and Lough Allua.

7.3.9 Swan and Goose Feeding Distribution Surveys

Winter hinterland surveys were carried out from October 2020 to March 2021. These surveys were for wintering target species. Species recorded during the winter surveys are listed in **Appendices 7.7, 7.11 and 7.14.**

During the winter season, 65 bird species in total were recorded including 31 target species. Of these target species seven are Red-listed, namely curlew, dunlin, golden plover, kestrel, lapwing, snipe and woodcock. Barnacle goose, golden plover, hen harrier, little egret, merlin, peregrine and whooper swan, which are listed on Annex I of the Birds Directive, were also recorded.

Whooper swan was observed during the months of November, February and March across three of the hinterland survey sites (The Gearagh, Lough Allua and Lee Valley). Observations of whooper swan, an Annex I listed species, were typically joined by those of greylag goose and mute swan during hinterland surveys.

7.3.10 Evaluation of Ornithological Receptors

The following species, which were recorded in the on-site surveys, 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 (Green-listed), as these species are potentially sensitive to wind energy projects. A summary of the status of each species follows.

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

Species	Annex I	Red list	Amber list	Green list
White-tailed eagle	Y	Y		
Hen harrier	Y		Y	
Sparrowhawk				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	
Goldcrest			Y	
Skylark			Y	
Swallow			Y	
Willow warbler			Y	
Starling			Y	
Wheatear			Y	
Grey wagtail		Y		
Meadow pipit		Y		
Linnet			Y	

Red grouse – Red List

Red grouse is resident on site. Suitable habitat for grouse occurs in western sector of the Redline boundary and continues westwards.

White-tailed eagle – Red List; Annex I

White-tailed eagle was observed on two occasions in the area to the west of the Redline Boundary (within 1 km of Site).

There was also a series of off-site records in the hinterland area. Most of these (listed below) were recorded from the Sillahertane/Grousemount area, c.7 km south-west of Inchamore:

April 2017: one c.6 km south-west of site (south of The Coom)

January 2018: adult flew west of Grousemount towards Sillahertane

February 2018: one feeding on dead sheep c.6 km southwest of site

March 2018: adult flew east from Lough Nabuddoga towards Sillahertane

10th May 2018: one in Sillahertane/Grousemount area

24th May 2018: one in Sillahertane/Grousemount area (probably same as previous)

11th July 2018: sub-adult in primary moult stage, Sillahertane/Grousemount area

22nd August 2018: sub-adult in primary moult stage, Sillahertane/Grousemount area

13th September 2018: sub-adult in primary moult stage, Sillahertane/Grousemount area.

From the pattern of records, it is considered that while white-tailed eagle has a presence in the wider area, however it is rare within the immediate Site area.

Hen harrier – Amber List; Annex 1

Hen harrier was recorded on-site at Inchamore and in the surrounding area during the winter survey periods (October-March). Both sexes, as well as ringtails (immatures) were observed, with birds either foraging or merely flying. There was no evidence of winter-roosting on site or in surrounding areas.

From the pattern of records, it is considered that hen harrier is an occasional winter visitor to the Site. The presence of hunting birds in winter in areas such as the Site is consistent with their dispersal from breeding areas (possibly though not necessarily from the Mullaghanish to Musheramore Mountains SPA).

Sparrowhawk – Green List

Sparrowhawk, a Green-listed species in Ireland, was observed in both summer and winter. Habitats suitable for breeding and foraging occur within the Site and in surrounding areas.

Buzzard – Green List

Buzzard, a Green-listed species in Ireland, was observed on only one occasion during the surveys and it is considered that this species is rare in the study area.

Kestrel – Red List

Kestrel was the most frequently encountered bird of prey, both in summer and winter, with individuals observed hunting regularly within the site.

The level of activity recorded for this species is indicative of a breeding territory in the vicinity (likely 1-2 km distance) of the Site.

Merlin – Amber List; Annex I

Merlin had a presence in the area during summers 2017 and 2018, with local breeding considered likely. However, there were no sightings at all in the 2020-21 surveys.

From the pattern of records, it is considered that a merlin territory overlaps with the western sector of the Site.

Peregrine – Green List; Annex I

The sightings of single birds as well as an interacting pair in the immediate area of the Site indicates that the Site is likely to be within a territory of a pair of peregrines.

Golden plover – Red List; Annex I

This Red-listed and Annex I species was noted primarily during winter surveys in 2017/18 and 2018/19. Records were concentrated in the western sector of the Site.

From the pattern of records, it is considered that Golden Plover is a visitor to the Site in winter and at times of spring and autumn migrations.

Snipe – Red List

Snipe was recorded on site in small numbers during winter. While there was no evidence of snipe breeding within the site, much of the bog and wet heath habitat is considered suitable for supporting breeding snipe.

Woodcock – Red List

Woodcock was recorded on one occasion in winter 2017/18. While there was no evidence of woodcock breeding within the site.

Grey Wagtail - Red List

Regular on site and considered to breed along streams downstream of the site.

Meadow Pipit – Red List

A widespread species on heath, bog and grassland habitats. Breeds on site and also present in winter (though scarcer then). Post-breeding flocks often seen in late summer and autumn.

Goldcrest – Amber List

A widespread breeding species within the conifer plantations on site. Scarce in winter.

Skylark – Amber List

A widespread breeding species of the open heath, bog and grassland habitats. Largely absent in winter.

Swallow – Amber List

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

Willow Warbler - Amber List

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

Wheatear – Amber List

Passage migrant, mainly in spring. May breed locally.

Starling – Amber List

Observed mainly in winter. May breed in local farm buildings.

Linnet – Amber List

May breed on site. Scarce in winter.

7.3.11 Overview of conservation importance of the Site for birds

The Site supports a number of bird species characteristic of peatland habitats.

Merlin, an Annex I species, appears to have had a breeding territory which overlapped with the site area in both 2017 and 2018 and used the resources of the site for breeding. Although it was not recorded in summer surveys in 2020 or 2021, it is noted that merlin is a particularly difficult species to census and may be under-recorded using traditional survey methods (Lusby *et al.* 2011).

Hen harrier (Annex I species) is an occasional winter visitor to the site, with suitable foraging habitat available within the site and the surrounding areas. While the origin of the birds is unknown, it is possible that the birds may be associated with the breeding population in the Mullaghanish to Musheramore Mountains SPA. The population in the SPA had undergone a serious decline (1-2 pairs in 2015-2019 period) until a recovery in 2020 (5 confirmed pairs fledging 10 young). In 2021, there were three confirmed and one possible breeding pairs recorded within the SPA (Hen Harrier Project Monitoring Report, 2021).

White-tailed eagle (Red list & Annex I) was recorded within a kilometre distance of the site on two dates and has a scarce presence within the hinterland of the site.

Two Red-listed species, red grouse and meadow pipit, are resident in the western peatland sector of the site. A further Red-listed species, kestrel, utilises the site for hunting, while golden plover (Red listed & Annex I species) occurs within the site (peatland habitats) at times in winter and when on passage. Snipe and woodcock (both Red-listed) were recorded on site during winter.

A range of Amber-listed species breed within the site, including skylark, 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 and heath component of the site is rated as of County Importance for birds (following NRA 2009 Guidance). The afforested area of the site is of low importance for birds and is rated as Local Importance (low value).

7.4 ASSESSMENT OF EFFECTS

7.4.1 Do Nothing Impact

Without the Project proceeding, it is expected that the existing main land uses on site, namely forestry and livestock grazing, will continue.

The value of the site for birds would be expected to remain fairly similar as at present though any increase in grazing pressure could be detrimental to the quality of peatland habitats on site which could affect species such as red grouse. Also, any further afforestation on heath and bog habitats would be highly detrimental to peatland bird species, including red grouse, merlin, meadow pipit and skylark.

7.4.2 Construction Phase Potential Effects

7.4.2.1 Habitat loss

The permanent loss of habitat to facilitate the construction of the project is approximately 30.75 ha. The largest component of this is conifer plantation (26.13 ha). Whilst some birds of conservation importance which were recorded in the study area utilise conifer plantation, including merlin (if tree-nesting) and woodcock, there will still be an abundance of conifer plantation within the site and surrounding areas. From the perspective of birds, the effect by the loss of conifer plantation is rated as Not Significant.

The construction of T1 and T3 will result in the permanent loss of approximately 2.5 ha of wet heath and blanket bog habitat, with a further loss of 1.63 ha of cutover bog as a result of the construction of T3. These peatland habitats are utilised by bird species such as red grouse, merlin, kestrel, golden plover and meadow pipit (all Red-listed).

However, as wet heath, blanket bog and cutover bog are widespread habitats within the local area and in upland areas throughout much of the south-west region, the significance of the effect on birds by the loss of 4.1 ha of peatland habitat is considered to be a Moderate Adverse Effect of Long-term duration. It is expected that viable populations of the bird species which were recorded during the baseline surveys will remain on site after the project is complete.

The difference in dimensions within the Turbine Range will not result in a likely increased magnitude of impact on setting that would result in changes to predicted effects.

7.4.2.2 Disturbance to Breeding Birds During Construction

The construction phase for the Project is anticipated to last approximately 21 months, with commissioning taking a further 3 months. In this period, on-site activities, including tree felling, civil works and turbine erection works, have potential to cause significant disturbance effects on birds of conservation importance in adjoining areas.

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

It is noted that passerine species, such as meadow pipit and skylark, are not perceived as being prone to disturbance by wind farm construction (SNH 2017) and indeed Pearce

Higgins *et al.* (2012) found that densities of skylarks and stonechats increased on wind farms during construction.

Of the bird species which are identified as Important Ecological Features (IEFs) at the Development site, two were recorded breeding within 500 m of where construction works will occur – these are merlin and red grouse and potential disturbance effects are considered below. In addition, works for the laying of the grid connection cable will be within 500 m of suitable hen harrier breeding habitat.

As it is noted that potentially suitable breeding habitat occurs within or around the site for a number of species which have a presence in the area (as shown by the baseline surveys), namely sparrowhawk and kestrel and snipe, focused pre-construction surveys will be undertaken for these species to establish if the breeding status has changed by the time of construction. Pre-construction surveys will include search for breeding woodcock.

Should pre-construction surveys indicate a requirement for protection from construction-related disturbance of any relevant species, appropriate measures (as described in **section 7.5.2.3**) will be taken to comply with all relevant legislation and best practice guidance available at the time.

The baseline surveys carried out from 2017 to 2021 indicated that further target species may occur as non-breeding species within 500 m of where construction works will occur and could be affected by disturbance – these are white-tailed eagle and golden plover.

White-tailed eagle

White-tailed eagle is considered in the NatureScot (2022) review of disturbance distances in birds. The species is rated as of 'high sensitivity' to disturbance, with a buffer zone of 250-500 m suggested for both breeding and wintering birds.

While the species was recorded within the study area on two occasions, both off-site but within 500 m to 1,000 m distance of the redline boundary, there is no evidence to show that the site is within a regularly used feeding or roosting area by the birds (and there are no known nesting sites within at least a 5 km distance of the site).

On this basis, it is considered unlikely that construction works would have significant effects on foraging birds which may pass through the study area - significance of potential effect rated as Not significant.

Hen harrier

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

A section of the grid connection route is located along the route of an existing forestry road which runs north of the Mullaghanish to Musheramore Mountain SPA. The closest distance between the cable route corridor and the SPA boundary is 170 m (chainage 9,600 m). Construction works carried out during the breeding season could cause significant disturbance to displaying, nesting and/or foraging hen harriers (Special Conservation Interest) within the sector of the SPA closest to the work area. In absence of mitigation, the potential disturbance effect on breeding hen harrier is considered to be a Significant Adverse Effect of Short-term duration.

While hen harriers were recorded during winter within the site for the wind farm and in surrounding areas, there was no evidence of a winter roost within at least a 2 km distance of the Redline boundary of the Site. It is considered unlikely that construction works would have significant effects on foraging birds which may pass through the study area during winter - significance of potential effect rated as Not significant.

Merlin

The habitats in the study area, *i.e.* bog/heath and conifer plantation, are suitable for supporting breeding merlin, with evidence of a merlin territory overlapping with the Redline Boundary in 2017 and 2018.

As merlin is a particularly difficult species to census and the traditionally used methods may not provide a true indication of the abundance, densities or distribution of the species (Lusby *et al.* 2011), it is possible that merlin may also have been present in summers 2020 and 2021.

Merlin is considered in the NatureScot (2022) review of disturbance distances in birds. The species is rated as of 'medium sensitivity' to disturbance, with a buffer zone of 300-500 m from construction works (including felling) suggested for breeding birds. For disturbance by forestry operations, Currie & Elliot (1997) gave a distance range of 200 m to 400 m for merlin.

Should merlin breed in future years within or close to the development area for the proposed wind farm, it is considered that the construction of the wind farm would likely have a potential disturbance effect on breeding birds 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 merlin, pre-construction survey will take place in all suitable breeding habitat within the site and for a distance of at least 500 m from work areas. As required, mitigation will be undertaken to reduce the significance of this potential effect on breeding birds (see **section 7.5.2.3**).

It is considered unlikely that construction works would have effects on birds passing through the site in winter or during migration seasons as in these seasons the birds are highly mobile and tend to have large hunting ranges – significance of potential effect rated as Imperceptible or Not significant.

Red grouse

Habitat suitable for supporting red grouse occurs in the western sector of the site and continues westwards of the Redline boundary. The species was recorded breeding within the Site (though numbers of territories not established).

Red grouse is not considered in the NatureScot (2022) review of disturbance distances in birds. In a review of monitoring data from wind farms located on enclosed 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 suggested. At the site for the Development, construction works, and especially works associated with T1, will take place within habitat which supports breeding red grouse.

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 from the site boundary – this is rated as an Adverse Significant Effect of Short-term duration. Due to the high conservation status of red grouse, a pre-construction survey will be carried out in all suitable breeding habitat within and adjoining the site and as required, mitigation will be undertaken to reduce the significance of this potential effect on breeding red grouse (see Section 7.5.2.3).

Golden plover

Golden plover is a winter / passage visitor to the study site. The birds were recorded within the western sector of the Site. Most of the records were of birds flying though some were of roosting birds on bog/heath.

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.

It is considered unlikely that construction works would have a Significant adverse effect 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 adverse effect is rated as Slight.

7.4.2.3 Nest Damage or Destruction

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

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

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

7.4.3 Operational Phase Potential Effects

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

1. collision,
2. displacement,
3. barrier effects,

Disturbance from secondary operations, such as road maintenance, are also considered.

7.4.3.1 Collision

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

impacts considers all scenarios within the range of turbine parameters proposed for the Development as shown in **Table 7.4** below.

Table 7.4: Turbine Parameters

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	177 m to 185 m
Rotor Diameter	149 m to 155 m
Hub Height	102.5 m to 110.5 m

Collision Risk Modelling (CRM) is a method to estimate the number of birds likely to collide with turbines at the 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 2017-2019 (two breeding seasons and two winter seasons) at the Site was used. There are three potential turbine models which may be used at the proposed wind farm, where appropriate calculations were run separately for each of the three models. 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 7.17**.

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

- Hen harrier
- Buzzard
- Kestrel
- Peregrine
- Golden plover

Other species of conservation concern were recorded in the vantage point surveys but were excluded from consideration in the collision risk analysis due to the following reasons:

White-tailed eagle – recorded within the potential collision risk height bands from VPs 1 & 2. However, the total flight time of these recordings did not exceed 70 seconds. Therefore, this species has been excluded from the analyses due to the low level of flight activity recorded.

Sparrowhawk – not recorded flying within the collision risk height band. Thus, for this species, the collision risk can be assumed to be effectively zero and the species is excluded from further consideration.

Merlin – recorded flying within the collision risk height band from VP 3. VP 3 has been excluded from the analysis as the viewshed does not include any of the proposed turbine locations. Since there are no turbines located within the viewshed, the predicted number of collisions is zero.

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

Table 7.5: 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 project (30 years)	Mean number of predicted collisions per year	One bird collision every 'x' years
Hen Harrier	0.046 birds	0.002	500 years
Buzzard	0.019 birds	0.006	166.6 years
Kestrel	6.25 birds	0.209	4.8 years
Peregrine	0.923 birds	0.031	32.6 years
Golden plover	688 birds	22.9	0.04 years

For hen harrier, buzzard and peregrine, the predicted number of collisions over the lifetime of the project is less than one bird, which is an effect rated as Imperceptible.

Two species are predicted to have more than one collision over the lifetime of the project – kestrel and, particularly, golden plover. The effect on these two species is considered further.

Kestrel

For kestrel, the collision risk modelling has calculated a rate of 6.25 collisions over the lifetime of the Project or 0.209 casualties per year. While these rates are negligible in the context of the estimated national population of 13,500 birds (Lewis *et al.* 2019), 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, Hotker *et al.* 2006, Hotker 2008, Lucas *et al.* 2008, Marques *et al.* 2014). This is expected to be due to the hovering behaviour of the species. While birds are hunting and focusing on ground prey, they may be unaware of the turbine position or may suddenly change their position due to a gust of wind. The hovering height level is often within the rotor sweep of the turbines. Of eight casualties recorded at a wind farm in Cadiz Province, Spain, all were juveniles.

Taking into account the high conservation status (Red list) of the species and the known susceptibility of the genus to collision, the significance of collision risk for kestrel is rated as a Long-term Moderate Adverse effect.

Golden plover

Golden plover is a winter and passage visitor to the Site, with birds typically observed flying over the bog and heath habitats in the western sector of the site. The collision risk modelling has predicted a rate of 22.9 collisions and 688 over the lifetime of the project.

Golden plover is an Annex I listed species and a Red-listed species in Ireland. 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.

Hotker *et al.* (2006) cited four golden plover casualties (Netherlands, Sweden, Germany) in their review of all bird casualties at wind farms in Europe up to July 2004. In a study of collisions with turbines on the German island of Fehmarn, Grunkorn (2010) recorded 3 golden plover casualties during autumn 2009.

While the predicted collision rates are relatively low in the context of the estimated All-Ireland wintering population (92,060, Burke *et al.* 2019), 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 and the recent significant long-term decline in the wintering population.

7.4.3.2 Displacement effect due to turbines

Displacement of birds from otherwise suitable habitat as a result of the presence of wind turbines has been reported as a potential impact of wind turbines (Drewitt & Langston 2006, de Lucas *et al.* 2007, Pearce-Higgins *et al.* 2009). The displacement occurs as a result of behavioural responses that prevent or decrease the use of an area for activities such as nesting or foraging. However, the results of studies on potential displacement have varied widely and in an overall review of the literature Madders & Whitfield (2006) concluded that displacement effects of wind turbines on raptors, including hen harrier, are negligible for the most part. Further evidence that hen harrier may not be displaced by the presence of turbines is from a study at the Derrybrien Wind Farm, Co. Galway (Madden & Porter 2007), where birds were observed flying close to wind turbines (<50 m) and on one occasion within 10 m of the base.

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 study area, and which mostly have a high conservation status:

Sparrowhawk

The baseline surveys showed that sparrowhawk is regular at the Development Site. While not proven during the baseline surveys, breeding is likely to occur in the local area.

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 Development Site - significance of potential effect rated as Imperceptible or Not significant.

Merlin

The evidence from the baseline surveys showed that there was a merlin breeding territory within the area of the site in 2017 and 2018.

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

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

Kestrel

Kestrel was recorded regularly during the baseline surveys, with breeding expected to occur in the local area. At the least, the species uses the survey area 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.

Hen harrier

The baseline survey data showed that hen harrier is an occasional winter visitor at the proposed wind farm site but there was no evidence of winter roosts.

There appears to be no data to show whether wintering hen harriers are displaced from an area around turbines, though for breeding birds Madders and Whitfield (2006) tentatively rated foraging hen harriers as having a 'low-medium' sensitivity to displacement.

As hen harrier is at most an occasional visitor to the Site for the Development site, it is expected that birds would still pass through the area when the turbines are in operation and that the potential for disturbance to foraging birds is low – this effect is rated as Not Significant.

Snipe

Snipe was not recorded breeding on site in the baseline surveys. In winter, snipe is expected to be a widespread species in bog and heath habitat in the vicinity of the proposed Development Site area.

It is considered unlikely that the presence of the Development would have adverse effects on snipe utilising the bog and heath outside of the breeding season, as snipe is a particularly widespread species during winter and may often occur in active agricultural lands - significance of potential effect on wintering birds rated as Not significant.

Red grouse

The baseline surveys showed that red grouse is resident in the western sector of the 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 is Not significant, and the presence of the 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 is a winter visitor and passage migrant in the western sector of the site.

There appears to be no data to show whether wintering golden plover are displaced from an area around turbines, though for breeding birds 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 200m.

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.

7.4.3.3 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 Development 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. Furthermore, the Development is of only five turbines which are not in proximity to any other group of turbines so there cannot be a barrier effect in combination with other projects.

7.4.3.4 Other wind farm activities impact

Other wind farm activities during the operational phase include turbine servicing are 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 site, including species of high conservation value such as red grouse and kestrel.

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

7.4.3.5 Potential effects on Birds of the Hinterland

While the hinterland surveys recorded a range of species of conservation importance, including wetland birds such as whooper swan at sites such as The Gearagh, Lough Allua and Gougane Barra Lough, none of these species were recorded in the vicinity of the site during the baseline surveys from 2017 to 2021.

It is concluded that the operational phase of the Project, as well as the decommissioning phase, would not have effects, including risk of collision, on birds associated with any of the hinterland sites surveyed.

7.4.4 Decommissioning Phase Potential Effects

During the decommissioning works there is a risk of disturbance and subsequent displacement to sensitive breeding species such as red grouse and merlin. 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.

7.5 MITIGATION MEASURES

7.5.1 Construction Phase

7.5.1.1 *Measures for Loss of Habitat*

The implementation of the Habitat Enhancement Plan will enhance blanket bog habitat for bird species associated with peatland habitats, including red grouse, merlin and meadow pipit. The regrowth of ling heather in the eroded blanket bog habitat would be of particular benefit to the local red grouse population.

This Plan, which provides for the enhancement of approximately 10.8 ha of blanket bog habitat, will compensate for the loss of breeding bog and heath habitat for birds.

7.5.1.2 *Measures to Prevent Disturbance to Breeding Hen Harriers*

A section of the grid connection route is located along the route of an existing forestry road which runs north of the Mullaghanish to Musheramore Mountain SPA, with the closest distance between the cable route corridor and the SPA being 170 m. To prevent any potential disturbance to nesting and/or foraging hen harriers, works will be restricted along the identified section to the period outside of the breeding season (March-August). This will ensure that the breeding hen harrier population within the SPA is not disturbed by the Project.

7.5.1.3 *Measures to Minimise Potential Disturbance to Sensitive Bird Species*

The present assessment has identified the potential for significant disturbance effects on two breeding species of conservation interest as a result of the construction works (see **Section 7.4.2.2**). These species are merlin and red grouse. Best available evidence has been reviewed and it is suggested that these species could be disturbed by works, including tree felling, at the following distances:

Merlin	500 m
Red grouse	500 m

As noted in section 7.4.2.2, pre-construction breeding surveys for selected species are required on the basis of the following:

1. Suitable breeding habitat exists within and around the Site for sparrowhawk, kestrel and snipe, which were recorded as non-breeding during the baseline surveys but which could breed within the study area in future years;
2. Specific survey for the presence of woodcock in the study area was not carried out as part of the baseline surveys.

Should the pre-construction surveys indicate a requirement for protection from construction-related disturbance, including tree-felling, of any relevant species, appropriate measures will be taken in line with all relevant legislation and best practice guidance available at the time to ensure that breeding attempts are not disturbed by construction related works.

Best available evidence has been reviewed (Currie & Elliot 1997, NatureScot 2022, Pearce-Higgins *et al.* 2012, Scottish Natural Heritage 2016) and it is suggested that the following species could be disturbed by construction works, including tree felling, at the following distances:

Sparrowhawk	200 m
Kestrel	200 m
Snipe	400 m
Woodcock	200 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, if needed, will apply from March to August (inclusive) and will ensure that the works will not have an adverse effect on the identified species of conservation importance recorded during the baseline surveys or in pre-construction surveys.

7.5.1.4 Measures to Minimise Potential Disturbance to Nesting Passerine Species

A range of passerine bird species breed within the Site, including the Red-listed meadow pipit and the Amber-listed goldcrest and willow warbler. In compliance with Section 40 of

the Wildlife Acts 1976 as amended, all vegetation required to be cleared to facilitate the works will be done outside of the restricted period from 1st March to 30th August.

Should it be necessary to remove vegetation during the breeding season, for instance where bramble and ephemeral plant species have become established on ground cleared earlier, this will be surveyed by an ornithologist up to 10 days before any clearance. Should an active nest be located, the area will be restricted from works by a distance where it is considered that the works would not cause disturbance or abandonment of the nest. Such distances, which will vary according to species and local topography, will be determined by the ornithologist. The restriction will be maintained until it is established that any young birds present have fledged. Should an instance arise where the placement of a restriction would have significant implications for the time frame of the Project, and where no alternative mitigation is available, the ornithologist will prepare a report (to include species, stage of breeding etc.) on the implications of removal of the nest in the context of the Wildlife Acts and consultation will be undertaken within the NPWS.

With the above mitigation implemented, the significance of the effect of disturbance to nesting passerine species can be reduced to a Slight Adverse Effect of Short-term Duration.

7.5.2 Operational Phase

7.5.2.1 Measures for White-Tailed Eagle

The present assessment has shown that the Site is within the known area of distribution for white-tailed eagle, with a bird recorded within 500 m of the Redline boundary.

While white-tailed eagle was excluded from collision risk analysis due to the low level of flight activity recorded, it is a species that is vulnerable to collision with wind turbines. Therefore, as a precautionary measure, mitigation will be implemented to minimise this risk.

It is noted that while the Site does not offer potential nesting sites to eagles, foraging birds could be attracted to the site to feed on carrion (as happened in the past close to Sillahertane Wind Farm where two eagle casualties occurred).

Once operational, a programme will be put in place to remove carcasses (mainly of sheep) from the site. This will involve search of the wind farm infrastructure area by site management for the presence of dead and/or injured animals (mostly lame sheep or animals caught in wire fencing). It is noted that such animals are usually identified by a concentration of corvids (ravens and hooded crows). Searches will be carried out on a weekly basis.

Should a carcass be located, this will be removed at the earliest opportunity by an appointed representative following standard practice for the disposal of carcasses (subject to Health and Safety issues). Injured or trapped animals will be reported to local landowners.

With mitigation in place, the significance of the effect of collision risk to white-tailed eagle as a result of the project is reduced to a Slight, Adverse, Long-term Effect.

7.5.2.2 Measures for Kestrel

Kestrel is regular at the Site, with birds using it for hunting purposes. As discussed in the impact section, kestrel is a species at risk of collision, as birds will be attracted to the ground around the turbines where prey items inhabit the low scrub type vegetation. As kestrel is a Red-list species, mitigation is proposed to avoid collisions.

Should monitoring during operation identify more than one kestrel casualty at a specific turbine(s), proactive measures will be taken to discourage the birds from hunting in the area of the relevant turbine(s).

This will involve clearing rank vegetation from around the relevant turbine(s) to make it less suitable for supporting prey items such as small mammals (mice, shrews, voles) and birds (meadow pipit, skylark etc). Vegetation clearing will be achieved by mowing and/or strimming. This approach has proved highly effective at several wind farms in central-eastern Spain where the number of collisions with lesser kestrel decreased by 75% to 100% after the ground was superficially tilled to a distance of 80m from the turbine base (Pescador *et al.* 2019). [It is noted that the maintenance of a low sward around the turbines during the operational phase is also required as mitigation to minimise bat collision].

With mitigation in place, the significance of the effect of collision risk to kestrel as a result of the project is reduced to a Slight, Adverse, Long-term Effect.

7.5.2.3 Monitoring

Pre-construction phase and construction phase monitoring

During the breeding season (March-August), bird monitoring surveys will take place to a distance of 500 m from the development area. The purpose of the monitoring will be to identify the presence of sensitive breeding species of conservation importance so that mitigation can be taken to avoid adverse effects on the breeding activities from the works.

The key species of concern at this site are red grouse and merlin, but with potential for breeding sparrowhawk, kestrel, snipe and woodcock. The monitoring surveys will be undertaken by a suitably qualified ornithologist.

Should the presence of any of these species be confirmed, the location of the nest will be identified (as far as is possible without causing disturbance to the birds) and a buffer zone of up to 500 m will be observed where works are restricted until the breeding activity is complete.

Post-construction monitoring

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). This will use the same 3 no. VPs 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). Usage of the site by, hen harrier, sparrowhawk, merlin, kestrel and golden plover will be of particular interest.

Distribution and abundance surveys

Distribution and abundance surveys will be undertaken to monitor short-term and long-term effects on bird populations within the site. Survey methodology will be similar to methods employed for baseline on-site EIAR surveys, which will allow a comparison of data to be made for each monitoring year. For merlin, best practice survey methodology as recommended at the time will be followed. Surveys will be undertaken in the same monitoring years as the vantage point surveys.

Red grouse survey

Repeat of the pre-construction red grouse survey (under licence) 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 objective of collision monitoring and corpse search is to establish whether bird fatalities are occurring as a result of collision with turbine blades.

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

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

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

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

The collision searches will be carried out in Years 1, 2, 3, & 5 of the operational phase of the wind farm.

7.5.3 Cumulative Effects

There are 26 wind farms within 20 km³ of the Inchamore proposed development (an area of 1,256 km²). **Figure 2.2 in Chapter 2** shows the location of proposed, permitted and operational wind farms within a 20 km radius of the Inchamore site and further information on these wind farms is provided in the EIAR (**Appendix 2.3, Chapter 2**). Of the 26, 18 no.

³ A distance of 20 km is taken as a precautionary distance for potential in-combination effects to occur – such a distance is beyond the normal foraging range of bird species associated with SPAs.

are operational (175 turbines total), 6 no. are permitted (25 turbines), 1 no. is at pre-planning stage (17 turbines) and 1 no. is proposed (14 turbines).

The nearest operational wind farms to the Inchamore site are Coomagearlaghy, Kilgarvan Wind Farm (15 turbines), which is located 2.7 km to the south-west, and Inchee, Poulbatha & Foilgreana (6 turbines), which is located 3.3 km to the south-west. The permitted Gortnakilla, Clonkeen, Killarney Wind Farm is located 1.87 km to the west of the Inchamore site.

Most of the wind farms are clustered to the north-east, south and south-west of the Inchamore site.

If permitted, the Inchamore project will add a further 5 turbines. Based on the locations of the 26 wind farms, it is expected that most are on heath and/or bog habitats and the construction of such projects would have (or will) caused loss and disturbance of peatland habitats which may support bird species such as red grouse and merlin. The construction of the Development will contribute to an existing and ongoing (unquantified) adverse effect on bird species associated with loss of peatland habitats.

All of the 26 wind farms are within the range of the Kestrel population and present (or will present when built) some risk of collision for this species. The operation of the Project will contribute to an existing collision risk for kestrel. However, with implementation of the mitigation as presented in this report, the risk from the Project is minimised.

All of the 26 wind farms are within the range of the wintering and migratory golden plover population and are likely to present (or will when built) some risk of collision for this species.

The operation of the Project is likely to contribute to an existing collision risk for these two species.

7.6 RESIDUAL EFFECTS OF THE DEVELOPMENT

With mitigation measures as presented in this report implemented in full, and specifically construction phase mitigation for breeding birds of peatland habitats, as well as precautionary measures during operation phase to discourage usage of the Site by white-tailed eagle and the areas close to turbines by kestrel (as required), it is considered that the significance of the predicted adverse effects on birds as a result of the Project will range from Imperceptible to Moderate.

Whilst loss of peatland habitat will reduce the area of suitable breeding habitat available for red grouse, merlin and meadow pipit (species of high conservation importance), it is not expected that this will have a significant adverse residual effect as the loss is a relatively small amount of the available peatland habitat in the local area, *i.e.*, extending westwards from the redline boundary. Also, the Habitat Enhancement Plan will compensate for the loss of peatland habitat. Similarly, the relatively small amount of habitat loss as a result of the Project is not expected to have any residual impact on species which use the site for feeding and/or roosting, including hen harrier, kestrel and golden plover.

The construction phase of the Project may result in disturbance to breeding birds within a distance of up to 500 m of the works boundary. In absence of mitigation, this is expected to have adverse effects on scarce species such as red grouse, merlin and hen harrier (latter along grid connection route). With mitigation in place, comprising the use of work restrictive zones around identified nests areas (if present) and a seasonal restriction on work along the grid connection route where hen harrier occurs, the Project is not expected to have any residual effect on these species.

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.

During the operational phase of the Project, birds will be at some risk of collision with turbines. The significance of residual effects will range from Slight Adverse for kestrel to Moderate Adverse for golden plover.

The baseline surveys did not identify any regular migration routes or local movements of wetland bird species through the site. The project is not expected to have any residual effect on migrating species or local wetland bird populations.

With mitigation in place to prevent disturbance during the construction phase to breeding hen harriers within the Mullaghanish to Musheramore Mountains SPA (as detailed in the Natura Impact Statement), the Project is not expected to have any residual effects on the Special Conservation Interests of this SPA or the SCIs of any other Special Protection Area.

7.7 CONCLUSIONS

An assessment of effects on ornithology has been carried out at the site for the Project. This is based on detailed survey information from 2017 to 2021.

The study site supports species of conservation importance which are associated with peatland habitats – these include breeding merlin, red grouse and wintering golden plover. Overall, the site is rated as of County Importance for birds. The grid connection corridor passes close to the Mullaghanish to Musheramore Mountains SPA, with hen harrier the Special Conservation Interest.

The principal ornithological effects as a result of the proposed wind farm project at Inchamore are as follows:

- Loss of 4.1 ha of peatland habitat, which is rated as a Moderate Adverse Effect of Long-term duration. With compensation by implementation of a Habitat Enhancement Plan, effect reduced to Slight Adverse of Long-term duration.
- Likely construction related disturbance to hen harrier, merlin and red grouse, which is rated as a Significant Adverse Effect of Short-term duration. With mitigation by establishment of buffer zone where works will be restricted during the breeding season, effect reduced to Not Significant.
- Likely construction related disturbance to nests of passerine species, including Red-listed meadow pipit, which is rated as a Significant Adverse Effect of Short-term duration. With mitigation by clearing of vegetation outside of breeding season and ongoing monitoring during construction phase, effect reduced to Slight Significant Adverse Effect of Short-term duration.
- Collision risk to kestrel and golden plover, rated as Adverse Effect of Moderate Significance of Long-term Duration. With mitigation implemented for kestrel by discouraging birds from hunting at turbine locations, significance of effect is reduced to Slight. For white-tailed eagle (recorded within 500 m of Redline boundary of site), a precautionary approach is proposed to discourage birds from feeding in the area of the wind farm, as this species is sensitive to collision.
- The proposed Project includes rigorous ornithological monitoring (in line with best practice guidance) at pre-construction, construction, and operational phases.

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