

8. Ornithology

Introduction

8.1 This chapter considers the likely significant effects on ornithology associated with the construction, operation and decommissioning of the proposed Carnbuck Wind Farm, in the townlands of Carnbuck, Magheraboy and Moneyneagh, near Corkey, County Antrim. The Proposed Development is adjacent to the existing Gruig Wind Farm. The specific objectives of the chapter are to:

- describe the ornithology baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects;
- assess the residual effects remaining following the implementation of mitigation.

8.2 The assessment (including all field survey) has been carried out by David Steele:

- Professional qualifications - B.Sc. (2i Honours), Zoology, University of Aberdeen (1988);
- Professional experience - 33 years working as a professional ornithologist throughout Britain and Ireland, covering a wide range of bird species and methodologies including those particularly relevant to on-shore wind farm work (raptor monitoring, moorland bird surveys and breeding wader surveys). This work has been for a range of organizations including the Royal Society for the Protection of Birds, British Trust for Ornithology, Birdwatch Ireland and Scottish Natural Heritage (Seabirds Team). For the last 19 years working as a freelance consultant and has completed the fieldwork and ornithology assessments for 19 wind farm proposals in Northern Ireland and has also completed training on collision risk modelling.

8.3 The chapter is supported by:

- Technical Appendix 8
- Figures 8.1 - 8.13 are referenced in the text where relevant.

Legislation & Planning Policy

8.4 The ornithology assessment has been carried out with reference to the following key pieces of legislation and planning policy guidance:

- The Wildlife (Northern Ireland) Order 1985 (as amended) which describes general protection measures for wild birds and in particular Schedule 1 to the Order which details those species (for example birds of prey) that have special levels of protection;
- The Conservation (Natural Habitats) Regulations (Northern Ireland) 1995 (as amended).
- Annex 1 of the EC Birds Directive which details those bird species which are of particular conservation concern in Europe and which should be subject to special measures concerning their habitats in order to ensure they maintain a favorable conservation status.
- The current Planning Policy Statement (PPS) for Northern Ireland and other published DAERA advice for planning and natural heritage interests.

Scope of Assessment

General Effects of Wind Farms on Birds

- 8.5 On-shore wind farms can potentially effect birds in two main ways - by displacement of birds around the turbine array (leading to indirect habitat loss) or by creating a risk of collisions with the turbines. Direct habitat loss from the wind farm infrastructure is usually relatively small scale compared to other sorts of developments and in most cases is unlikely to be significant for bird communities¹.
- 8.6 The ornithology assessment therefore focuses on assessing potential displacement effects and (if relevant) collision risk effects of the Proposed Development. The assessment considers potential effects on bird communities found within the Preliminary Site Boundary (hereafter referred to as "the Site") and in defined surrounding buffer areas. Where relevant, the assessment also considers the potential cumulative effects resulting from other existing, consented or proposed wind farms in the vicinity.

Bird Species Requiring Assessment

- 8.7 All wild birds are subject to a general level of protection through the Wildlife and Countryside Act (Wildlife Order in Northern Ireland) and the EU Birds Directive however in line with guidance² only some bird species should generally be of concern in relation to wind farms:
- Birds on Annex 1 of the EU Birds Directive;

¹ Percival, S. (2005): Birds and wind farms, what are the real issues? (British Birds 98 / 4)

² SNH (2018): Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas (Guidance, February 2018)

- Birds on Schedule 1 to the Wildlife and Countryside Act (Wildlife Order in Northern Ireland);
- Regularly occurring migratory species;
- Species listed on the non-statutory lists of Birds of Conservation Concern (BOCC) for the United Kingdom and the island of Ireland.

8.8 The SNH guidance recommends that assessment of the effects of a wind farm on birds will normally be limited to those species included within the above categories. Additionally, SNH are of the view that passerine species (e.g. small moorland birds such as skylarks and meadow pipits) are not significantly impacted by wind farms³. However, all bird species (including passerine species) need to be considered in relation to the general levels of statutory protection afforded by the Wildlife (Northern Ireland) Order⁴.

Designated Conservation Areas

Antrim Hills SPA

8.9 Post transition from the European Union the United Kingdom is still required to identify internationally important areas for birds and designate them as Special Protection Areas. The Proposed Development is adjacent to the Antrim Hills Special Protection Area (SPA) and the assessment therefore gives full consideration to possible effects on the SPA, which is designated for its breeding populations of hen harrier and merlin⁵.

ASSIs

8.10 The Slieveanorra Area of Special Scientific Interest (ASSI) is within moderate proximity of the Proposed Development. The ASSI is designated for merlin and hen harrier and overlaps extensively within the local part of the Antrim Hills SPA and the assessment therefore also considers possible effects on the ASSI.

Consultation

8.11 Northern Ireland Raptor Study Group (NIRSG) engaged in discussion and shared general information on breeding activity by Annex-1 raptor species occurring in the vicinity of the Proposed Development. Information was given on a personal communication basis and not as part of a formal data request. Key issues in relation to the results of the consultation with NIRSG have been addressed in the relevant parts of the assessment of effects.

³ SNH (2014 and 2017): Recommended bird survey methods to inform impact assessment of onshore wind farms (Guidance Notes, May 2014 and March 2017)

⁴ NIEA: The Wildlife Law and You in Northern Ireland (Northern Ireland Environment Agency Biodiversity Series Booklet)

⁵ Citation for Antrim Hills Special Protection Area (Northern Ireland Environment Agency)

- 8.12 A consultation response in relation to the Proposed Development was received by the Applicant from Forest Service⁶ and included reference to the occurrence of hen harriers and merlins in the general vicinity.

Assessment Methodology

Baseline Characterisation

Study Area

- 8.13 The study area extended to the Preliminary Site Boundary (hereafter referred to as “the Site”) and surrounding buffer areas. The buffer areas depended on the target bird species being considered however they extended to at least 500 m around the turbine locations (e.g. for moorland passerines) up to a maximum extent of 3 km (for hen harriers).

Field Survey

- 8.14 Field surveys were carried out in line with the current SNH guidance for bird surveys at on-shore wind farms⁷. The different methodologies employed during the field surveys are described below.

Breeding Bird Surveys

- 8.15 Breeding bird surveys have been completed during three baseline years as summarised in Table 8.1. Further details of survey visits are provided in Technical Appendix 8.1. All surveys were completed using an adapted Moorland Bird Survey (MBS) method (also known as the “Brown and Shepherd” method)⁸. This method is particularly suitable for surveying the breeding wader species (curlew and snipe) and can also be used to survey red grouse.
- 8.16 SNH do not generally recommend survey of moorland passerines for wind farm developments however on sites where breeding waders are present in relatively small numbers then it is possible to include passerines in the MBS method. The principal target species for the breeding bird surveys were therefore the breeding wader species and also red grouse however moorland passerines were also noted.
- 8.17 The breeding bird surveys extended over the Site and a 500 m turbine buffer area. All Land Under the Applicant’s control was walked through. For areas outside the Applicant’s control (parts of the buffer area) survey was by appropriate periods of scanning with binoculars. For curlew the buffer area was

⁶ Ref. LA01/2022/0230/DETEIA 22 April 2022

⁷ SNH (2014 and 2017): Recommended bird survey methods to inform impact assessment of onshore wind farms (Guidance Notes, May 2014 and March 2017)

⁸ Gilbert, G *et al.* (1998): Bird Monitoring Methods - a manual of techniques for key UK bird species (RSPB)

extended up to 1 km by three methods: (1) by scanning and listening for calling birds in the additional area during the MBS visits; (2) during the vantage point surveys by scanning areas of potential habitat and listening for calls and (3) by looking and listening for curlews from public roads while moving around within the wider area around the Site.

Table 8.1 - Summary of Breeding Bird Surveys

Baseline Year	Survey Period	No. Survey Visits	Remarks
2021	April to July	4	Breeding season 3
2019	April to July	2	Breeding season 2
2018	April to July	2	Breeding season 1

Winter Bird Surveys

8.18 Surveys for wintering and migrating birds have been contemporaneous with the breeding bird surveys and have been completed during two winter / non-breeding periods as summarised in Table 8.2. Further details of the survey visits are provided in Technical Appendix 8.2. All the surveys were completed using the same adapted MBS method as employed for the breeding bird surveys. The surveys extended over the Site and a 500 m turbine buffer area

Table 8.2 - Summary of Winter Bird Surveys

Baseline Year	Survey Period	No. Survey Visits	Remarks
2021 / 22	October to March	4	Winter season 2
2018 / 19	October to March	3	Winter season 1

Vantage Point Surveys

8.19 An assessment of activity by raptors and other relatively large aerial species (e.g. migrating swans and geese) was completed from four vantage points (VPs) during three breeding periods and two non-breeding (winter and migration) periods as summarised in Table 8.3. Further details of the vantage point watches are provided in Technical Appendix 8.3.

8.20 An initial 15 consecutive months of vantage point surveys (from June 2018 to August 2019) were followed by an 18 month survey gap then surveys recommenced in April 2021 and continued for six months until September. Following a short gap surveys resumed by way of a shortened (three month) winter update survey during December 2021 to February 2022. Shortening the second winter survey period was due partly to the timing of the programme for the Proposed Development however it was also considered justified following a review of the results from the first winter period.

- 8.21 Vantage points were selected in line with current SNH guidance and within any constraints imposed by access restrictions. No turbine location was more than 2 km from a vantage point. The locations of the vantage points and the visibility coverage (2 km extents) are shown in Figure 8.1. In line with SNH guidance the visibility extents are shown at the minimum collision risk height (lower edge of the turbine rotor) however vantage points were selected so as to also provide an adequate view at or near ground level. Additional location details for each vantage point are given in Technical Appendix 8.4.
- 8.22 The vantage point watches were completed in line with the SNH method statement⁹. The surveys therefore extended to at least a 500 m extent around the proposed turbine locations (up to a maximum 2 km extent from each vantage point). The target species were: (1) all raptor species (with priority given to Annex 1 species) and (2) whooper swans and geese (winter and migration periods only). Other relatively large species (e.g. golden plovers and gulls) were recorded as secondary species. At the discretion of the observer, notes were also kept of any significant activity by smaller aerial species.
- 8.23 Vantage point watches were carried out at different times of day and in a range of weather conditions. Showery and moderately windy days were considered acceptable but not continuous precipitation or very strong winds. Most watches were of three hours duration but some shorter or longer watches (not shorter than one hour or longer than four hours) were also completed.

Table 8.3 - Summary of Vantage Point Survey Effort

Baseline Period	Period Duration (Months)	Vantage Point / Survey Effort (Hours)			
		VP1	VP2	VP3	VP4
Non-breeding period 2: Dec 2021 to Feb 2022	3	22.5	23	18	18
Breeding period 3: Apr to Sep 2021	6	36	36	36	36
Breeding period 2: Mar to Aug 2019	6	36	36	36	35
Non-breeding period 1: Sep 2018 to Feb 2019	6	36.5	36	36	36
Breeding period 1: Jun to Aug 2018	3	18	18	18	18

Winter Roost Surveys

- 8.24 During the late autumn and winter period a number of vantage point watches were targeted at detecting potential roosting activity by hen harriers. These commenced at least 30 minutes before sunset and continued until dusk (typically

⁹ SNH (2014): Recommended bird survey methods to inform impact assessment of onshore wind farms (Guidance Note, May 2014)

30 minutes after sunset). The roost watches are summarised in Table 8.4 and further details are provided in Technical Appendix 8.3.

Table 8.4 - Summary of Roost Survey Effort

Baseline Period (Winter)	Period Duration (Months)	VP / No. Roost Surveys Completed			
		VP1	VP2	VP3	VP4
December 2021 to February 2022	3	3	2	1	3
September 2018 to February 2019	6	2	2	0	3

Wider Area Surveys

- 8.25 Searches for breeding activity by raptor species in the wider area around the Site have been contemporaneous with the breeding season vantage point surveys and are summarized in Table 8.5. The selection of target species for these surveys depended primarily on indications provided by the vantage point surveys in combination with: (1) an assessment of potential raptor breeding habitat within the wider area; (2) the author's previous knowledge of raptor breeding activity within the wider area from both personal observations and professional survey and (3) review of published information and personal communications with NIRSG.
- 8.26 Following the above criteria the principal target species for the searches were hen harrier, merlin and peregrine. Current SNH guidance for these species indicates a wider area survey limit of 2 km extent¹⁰. However for hen harriers (considering the proximity of the Antrim Hills SPA) searches were extended to 3 km. Other raptor species that were likely to be breeding (based on indications provided by the vantage point surveys) were looked for within a 2 km extent.
- 8.27 The wider area searches were carried out on an opportunistic basis using appropriate methodologies and protocols for each species¹¹. Observations were made from roads and other areas with public access or access permissions. To avoid disturbance, all observations were made from a safe distance and no attempt was made to approach nest sites. Further details of the observations within the wider area are provided in Technical Appendix 8.14 (Confidential).
- 8.28 The viewpoint coverage for VP4 (used for the vantage point surveys) extends over the immediately adjacent part of the Antrim Hills SPA (where there are historical and potential nesting locations for hen harriers) and the observations from VP4

¹⁰ SNH (2016) Assessing Connectivity with Special Protection Areas (Guidance Note June 2016)

¹¹ Gilbert, G *et al.* (1998): Bird Monitoring Methods - a manual of techniques for key UK bird species (RSPB)

therefore made a significant contribution to the surveys of the adjacent part of the SPA.

Table 8.5 - Summary of Wider Area Raptor Searches

Baseline Year	Survey Period	Target Species / Survey Extent			
		Hen harrier	Merlin	Peregrine	Other
2021	April to July	3 km	2 km	2 km	2 km
2019	April to July	3 km	2 km	2 km	2 km
2018	April to July	3 km	2 km	2 km	2 km

Desk Study

8.29 The baseline characterisation has been achieved principally by way of the field surveys however for hen harrier and merlin additional historical information has been obtained by several methods including a review of published information, review of extensive information held by the author and by way of personal communications with NIRSG.

Sensitivity Criteria

8.30 The sensitivity criteria principally follows the current non-statutory list of Birds of Conservation Concern published for the island of Ireland¹² (which lists those species considered to be conservation concern and therefore of a higher sensitivity) however other relevant published criteria (e.g. the Northern Ireland Priority Species List¹³) have also been considered.

Magnitude of Effect

8.31 Where possible magnitude of effects have been assessed in line with the relevant published research and guidance on the potential effects of on-shore wind farm developments on bird communities.

Significance Criteria

Favourable Conservation Status

8.32 The assessment of the significance of effects on bird communities primarily follows the Favourable Conservation Status (FCS) approach recommended by SNH¹⁴. This approach considers any potential effects on a species and assesses these in the context of the total national or regional population and distribution.

¹² Gilbert, G *et al.* (2021): Birds of Conservation Concern in Ireland 4: 2020-2026 (Irish Birds 43: 1 - 22)

¹³ Northern Ireland Environment Agency: Northern Ireland Priority Species List (NIEA, March 2010)

¹⁴ SNH (2018): Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas (Guidance, February 2018)

An impact should be judged to be of concern when it would adversely affect the favourable conservation status of a species (or prevent a species from recovering to favourable conservation status) at the regional or national level.

- 8.33 For assessing the significance of bird populations (or any expected losses at the national or regional level) the generally accepted 1% threshold level is used, therefore if a population (or loss) exceeds 1% of the national or regional population of the species then it should be considered to be significant.
- 8.34 In the assessment of effects, the probability of any given effect occurring (and the probability of any likely effects being significant) are described using the scale suggested by the Institute of Ecology and Environmental Management (IEEM)¹⁵ - the scale is given in Technical Appendix 8.5.
- 8.35 In line with the IEEM guidance, if relevant the assessment also considers possible local effects on bird communities. The assessment of the significance of local effects generally follows the same approach as for regional and national effects.

Baseline Conditions

Breeding Birds

Red grouse

- 8.36 The current status of red grouse within the study area is summarised in Table 8.6. Further details of red grouse observations are provided in Technical Appendix 8.6 and the locations are shown in Figure 8.2. The incidence and distribution of the observations indicates the presence of three red grouse territories (or pairs) within the study area (within a 500 m extent) with one additional territory located in the wider surrounding area (within a 1 km extent). The observations also indicate some overlap of the territory boundaries.
- 8.37 The territories within the 500 m extent are not restricted to this area but also extend into the wider surrounding area (within a 1 km extent). Although red grouse were observed to within a minimum distance of 300 m from the Proposed Development (turbine locations) the average distance (estimated territory centres based on the field observations) was 400 m, 500 m, 500 m and 750 m respectively for the four territories. Grouse were also observed to within a minimum distance of 200 m from the existing Gruig Wind Farm turbine locations and signs of grouse presence (droppings) were found on the existing Gruig Wind Farm tracks.

¹⁵ IEEM (2006): Guidelines for Ecological Impact Assessment in the United Kingdom

Table 8.6 - Summary of Baseline for Red Grouse

Baseline Period	Survey Period	No. of Territories within 500 m Extent	Additional Territories within 1 km Extent
All baseline	Winter and summer	3	1

Snipe

8.38 The current status of snipe within the study area is summarised in Table 8.7. Further details of snipe observations are provided in Technical Appendix 8.7 and the locations are shown in Figure 8.3. All observations were of birds calling from the ground (“chipping”) or engaged in “drumming” display flights (with the birds subsequently seen to land on the ground) and such observations are likely to give a good indication of territory locations. The incidence and distribution of the observations indicates the presence of three snipe territories (or pairs) within the study area (within a 500 m extent) with one additional territory located in the wider surrounding area (within a 1 km extent).

8.39 The average distance (estimated territory centres) of snipe from the Proposed Development (turbine locations) was 190 m, 240 m, 350 m and 630 m respectively for the four territories. Territorial snipe were also observed to within a minimum distance of 250 m from the existing Gruig Wind Farm turbine locations.

Table 8.7 - Summary of Baseline for Breeding Snipe

Baseline Period	Survey Period	No. of Territories within 500 m Extent	Additional Territories within 1 km extent
All baseline	Summer	3	1

Curlew

8.40 During the baseline period there was one observation of a curlew within the study area (within a 1 km extent). The observation was within a minimum distance of 1.1 km from the Proposed Development (turbine locations) and was of a single bird flying and calling before settling on the ground. There were no subsequent observations and the presence of a territory was not confirmed. Further details of the observation are provided in Technical Appendix 8.8 and the location is shown in Figure 8.3.

Moorland Passerines

8.41 The current status of moorland passerines within the study area (within a 500 m extent) is summarised in Table 8.8 and the locations of these species are shown in Figures 8.4 and 8.5. A total of 20 passerine species were confirmed or probably breeding within the study area and an additional ten species were recorded as transient visitors. The transient species were not breeding within

the survey area but occasionally visited the area to feed (for example flocks of juvenile starlings and rooks in late summer). The transient species are not included within the baseline but observations of these species are included within Technical Appendix 8.9.

8.42 Meadow pipit was by far the most abundant passerine species and was distributed very widely across the study area. Skylarks were also widely distributed within the study area but were less abundant overall than meadow pipits, probably due to habitat factors. Other species were present in smaller numbers and were distributed locally within the survey area.

Table 8.8 - Summary of Baseline for Moorland Passerines

Species	No. of Territories within 500 m Extent	Breeding Status	Remarks
Cuckoo	1	Probable	Singing male
Sand martin	1	Confirmed	Nest-burrow
Skylark	24	Confirmed	-
Meadow pipit	50	Confirmed	-
Whinchat	3	Confirmed	-
Stonechat	7	Confirmed	-
Wheatear	3	Confirmed	-
Grey wagtail	2	Confirmed	Linear territories along streams
Song thrush	1	Confirmed	-
Wren	5	Confirmed	-
Blue tit	1	Confirmed	-
Great tit	1	Confirmed	-
Willow warbler	3	Confirmed	-
Sedge warbler	2	Confirmed	-
Grasshopper warbler	3	Confirmed	-
Hooded crow	3	Confirmed	-
Chaffinch	2	Confirmed	-
Linnet	1	Confirmed	-
Redpoll	2	Confirmed	-
Reed bunting	10	Confirmed	-

Winter Birds

8.43 The current status of wintering bird species within the study area (within a 500 m extent) is summarised in Table 8.9. Further details of the observations are provided in Technical Appendix 8.9. A total of 17 bird species were recorded during the winter and migration surveys however most of these species are very widespread in distribution locally and regionally and were recorded within the survey area in relatively small numbers. Some larger flocks of birds (e.g. flocks of starlings and fieldfares) were occasionally observed however these were not typical of the average numbers present and are not exceptional within the wider local or regional context.

Golden Plovers

8.44 Golden plovers were observed during the period October to March however they were distributed only very locally within the study area and the numbers observed were small (average 25 birds). The observations typically involved small groups of birds resting on the highest elevation areas of hummocky blanket bog and flying rapidly away when disturbed by the surveyor. A number of additional golden plover observations were made at a regular resting spot ("Location 1") within the wider surrounding area (within a 1 km extent) - up to 90 birds were observed resting at this location which is c. 630 m from the Proposed Development (turbine locations). The golden plover observations (including Location 1) are shown in Figure 8.6.

Table 8.9: Summary of Baseline for Winter Birds

Species	No. of Observations	Maximum Count	Average Count
Grey heron	2	1	<1
Golden plover	7	90	25
Snipe	6	6	4
Jack snipe	1	1	<1
Great black-backed gull	5	3	2
Starling	4	500	<100
Fieldfare	5	400	<100
Redwing	1	1	<1
Stonechat	2	2	<10
Rook	6	500	<100
Hooded crow	8	25	6
Raven	8	150	24
Jay	1	4	<1
Magpie	6	2	2

Species	No. of Observations	Maximum Count	Average Count
Chaffinch	4	6	<10
Siskin	1	1	<1
Reed bunting	4	6	2

Vantage Point Surveys

Annex 1 Raptor Species

Overview

8.45 Activity by Annex 1 raptor species within the study area during the baseline period is summarised in Table 8.12 and described further under the relevant species headings below. Further details of the observations are provided in Technical Appendix 8.10 and the flight-lines are shown in Figures 8.7 - 8.9.

Table 8.10: Summary of Baseline Activity by Annex 1 Raptor Species

Species	No. of Observations	Remarks
Hen harrier	18	-
Merlin	6	Probably under-observed
Peregrine	12	-
Osprey	1	Migrating bird in July
Red kite	1	Winter season observation

Hen Harrier

8.46 Activity by hen harriers within the vantage point survey study area (within 500 m extent from the turbine array) is summarised in Table 8.11. Harriers were observed in most survey months however a majority of the observations were during the non-breeding period of September to February. Considering the baseline period as a whole then the observations indicate low levels of harrier activity within the study area including during the breeding period.

8.47 Most of the observations were of foraging birds however a small number were of birds engaged in direct travelling flight or soaring on thermals. There were no observations of breeding or roosting activity by hen harriers within the study area (within a 500 m extent from the turbine array). Of the total 18 harrier observations five were of adult males, four of immature males, five of unassigned females or immatures and four of juvenile (first calendar-year) birds.

8.48 There were four observations of harriers foraging partly within the existing Gruig Wind Farm turbine array including on one occasion to within c. 50 m of a turbine and including one observation of a successful prey capture within the turbine array.

Table 8.11: Summary of Baseline Activity by Hen Harriers

Baseline Survey Period	No. of Observations
Breeding (March to August)	7
Non-breeding (September to February)	11
Baseline total	18

Merlin

- 8.49 During the baseline period there were just seven merlin observations within the study area however it is recognised that activity by this species (due to its behaviour and small size) is likely to be underestimated by vantage point surveys. The observations were in February (1), March (1), June (2), July (2) and October (1). Considering the likely low survey efficiency for this species then the observations indicate that merlins are likely to occur within the study area throughout the year, with greater activity during the breeding period.
- 8.50 There were two observations of adult male merlins, three of females, one of a juvenile (first calendar-year) bird and one bird was unassigned to an age or sex category. One of the observations was of a female merlin flying with prey from within the existing Gruig Wind Farm turbine array. Another observation was of a juvenile merlin seen to land on rock armour c. 5 m from the base of Gruig Wind Farm turbine no. 6.

Peregrine

- 8.51 Activity by peregrines within the study area is summarised in Table 8.12. Peregrines were observed mostly during the breeding period March to August. Most of the observations were of birds engaged in direct travelling flight however there were also several observations of birds engaged in obvious foraging behaviour. There were five observations of peregrines flying partly within the existing Gruig Wind Farm turbine array, including one bird that successfully chased and captured a starling within the turbine array.

Table 8.12: Summary of Baseline Activity by Peregrines

Baseline Survey Period	No. of Observations
Breeding (March to August)	10
Non-breeding (September to February)	2
Baseline total	12

Other Annex 1 Raptor Species

- 8.52 During the baseline period there were single observations of osprey and red kite within the study area. The osprey observation (in July of the second summer baseline period) was of a bird travelling steadily southwest and partly within the

existing Gruig Wind Farm turbine array - it was observed to approach (into the wind) to within an extremely close distance (c. 5 m) of the hub and rotor-disc of Gruig turbine no. 6 before performing a controlled avoiding turn and continuing its journey to the southwest. The red kite observation was in February of the most recent winter baseline period however there were no observations of this species during the earlier baseline periods (both breeding and non-breeding).

Non-Annex 1 Raptor Species

Overview

8.53 Activity by non-Annex 1 raptor species within the study area during the baseline period is summarised in Table 8.13 and described further under the relevant species headings below. Further details of the observations are provided in Technical Appendix 8.11 and the flight-lines are shown in Figures 8.10 - 8.11.

Table 8.13: Summary of Baseline Activity by Non-Annex 1 Raptor Species

Species	No. of Observations		
	Breeding Period	Non-breeding Period	Total
Buzzard	37	9	46
Kestrel	28	14	42
Sparrowhawk	3	3	6

Buzzard

8.54 Buzzards were observed in all months except November and January however activity was significantly greater during the breeding period March to August. By comparison, activity during the non-breeding period was relatively low or even negligible. Most of the observations were of birds that were obviously foraging however there were also a number of observations of buzzards (up to four birds together) soaring on thermals.

8.55 A significant amount of the observed buzzard activity was within the existing Gruig Wind Farm turbine array and this is illustrated well by the mapped flight-lines, which show a marked concentration in this area. The activity within the existing Gruig array was mostly foraging activity and included some moderately prolonged foraging bouts (up to c. 14 minutes in duration). The slope between the two existing Gruig turbine rows was a particularly favoured area for foraging buzzards and this was probably due to a combination of factors including aspect (the slope faces southwest into the prevailing wind direction) and also habitat (the area within the existing Gruig array is relatively heterogeneous with numerous habitat patches and edges). The buzzard observations within the existing Gruig turbine array included numerous instances of birds passing freely between the turbine pairs (for which the spacing mid-point is typically c. 150 m)

and there was just one observation of a buzzard exhibiting unusual (erratic) flight behaviour in the vicinity of the turbines.

Kestrel

- 8.56 Kestrels were observed in all months except December and (curiously) April. Overall, there was significantly more activity during the breeding period March to August although the distinction was less marked than for buzzards. Almost all the observations were of foraging birds. There were ten observations of adult male kestrels, nine of females, sixteen of juveniles, one observation of a pair and six birds that were unassigned to an age or sex category. The majority of the kestrel observations during the late summer and early autumn period (August and September) were of juvenile birds.
- 8.57 As with buzzards, a significant amount of the observed kestrel activity was within the existing Gruig Wind Farm turbine array and this is illustrated well by the mapped flight-lines, which show a concentration in this area as well as along the adjacent valley of the Aghanageeragh River (an overlap area between the existing Gruig turbine array and the Proposed Development). As with buzzards, this observed pattern of foraging activity was probably due to a combination of factors including slope aspect and habitats.
- 8.58 The kestrel observations within the existing Gruig array included several instances of foraging birds approaching to within c. 50 m of turbine locations, one observation of a kestrel landing on the ground c. 20 m from a turbine base, one observation (of a pair of kestrels) perched on the Gruig Wind Farm meteorology mast and several observations of kestrels catching prey within the turbine array. There were no observations of kestrels exhibiting unusual (erratic) flight behaviour in the vicinity of the turbines.

Sparrowhawk

- 8.59 During the baseline period there were just six sparrowhawk observations within the study area however (as with merlins) it is noted that activity by this species is likely to be underestimated by vantage point surveys. The observations were in February (2), April (2), July (1) and December (1). Considering the likely low survey efficiency for this species then the observations indicate that sparrowhawks are likely to occur within the study area throughout the year.

Wider Area Surveys

Overview

- 8.60 Activity by raptor species in the wider area of the Proposed Development (within 2 km extended to 3 km for hen harriers) during the baseline period is summarised in Table 8.14 and detailed further under the relevant species headings below. The locations of observations within the wider area (including the locations of any confirmed nests) are shown in Figures 8.12 and 8.13 (Confidential).

Additional details of any breeding activity are provided in Technical Appendix 8.14 (Confidential).

Table 8.14: Summary of Raptor Breeding Activity in the Wider Study Area

Species	No. of Pairs	No. of Confirmed Nests	Remarks
Hen harrier	0	0	There are two historical hen harrier nest locations within the study area
Peregrine	0	0	There is a known peregrine breeding location at a quarry site located just outside the study area
Merlin	1	1	-
Kestrel	2	0	-
Buzzard	4	2	-
Red kite	0	0	Single observation of red kite during winter baseline period
Sparrowhawk	1	1	-

Hen Harrier

8.61 During the baseline period no hen harrier breeding activity was observed however the desk study indicated confirmed historical hen harrier nests at two locations within the study area. The historical locations are shown in Figure 8.12 (Confidential) and details are provided in Technical Appendix 8.14 (Confidential). The most recent historical nest ("Location 1") is c. 450 m from the Proposed Development and was last occupied in 2010 (12 years ago). The other historical nest ("Location 2") is c. 800 m from the Proposed Development and was last occupied in 2007 (15 years ago). This location is c. 1.5 km from the existing Guig Wind Farm and was occupied during the period of baseline studies for that development.

Winter Roosting

8.62 During the baseline period roosting by hen harriers was observed within the study area at one location ("Location 3 - Confirmed Roosting Spot") however on one occasion only. The location is shown in Figure 8.12 (Confidential) and details are provided in Technical Appendix 8.15 (Confidential). The Confirmed Roosting Spot is c. 600 m from the Proposed Development (turbine locations), c. 400 m from the existing Guig Wind Farm turbine locations and c. 170 m from the existing Guig Wind Farm tracks. The roosting observation was during the first winter baseline period and there have been no further observations of roosting during subsequent surveys including during the more recent update winter period. The

observations indicate that roosting by individual harriers occurs very occasionally within the study area however there is currently no indication of regular roosting activity or of communal roosting (involving more than one harrier).

- 8.63 The desk study has indicated historical observations of hen harriers roosting at Location 3 however these observations are now more than ten years old and more recent historical surveys (five years old) found no evidence of roosting at the location. Further details of the historical roosting observations (including nil results) are given in Technical Appendix 8.15 (Confidential). Regular winter harrier roosts in the uplands of Northern Ireland are typically found in areas that also have an established harrier breeding population during the summer period¹⁶ and the absence of roosting activity within the study area during the baseline and recent historical periods has paralleled the absence of harrier breeding activity in the vicinity during the same period.

Peregrine

- 8.64 During the baseline period no peregrine breeding activity was observed within the study area however the desk study has indicated breeding by peregrines at a working quarry located c. 2.2 km from the Proposed Development (so just outside the study area). The location is shown in Figure 8.13 (Confidential) and details are provided in Technical Appendix 8.14 (Confidential). During the baseline period there was no access to the quarry and it is not known if peregrines were present during this time however the desk study has indicated successful breeding at the location during the last ten years and peregrine activity observed during the vantage point surveys for the Proposed Development indicates that the quarry is likely to have been occupied during the baseline period. The quarry is c. 2.5 km from the existing Gruig Wind Farm and c. 1.4 km from the existing Corkey Wind Farm and has been occupied by peregrines during the operational phases of both those developments.

Merlin

- 8.65 During the baseline period merlins were confirmed breeding at two locations ("Location 1" and "Location 2") within the study area. The two locations are shown in Figure 8.13 (Confidential) and details are provided in Technical Appendix 8.14 (Confidential). The two locations are just 170 m apart and are alternative nest sites used by the same pair of merlins in different baseline years - Location 1 was occupied during the second baseline breeding season (summer 2019) and Location 2 during the third breeding season (summer 2021). Location 1 is c. 630 m from the Proposed Development (turbine locations and site entrance location) and Location 2 is c. 750 to 800 m from the Proposed Development (turbine locations and site entrance location respectively). Merlins are well

¹⁶ personal observations

known for switching their nest-sites between years (within a distance of up to several kilometres). The desk study has indicated that Locations 1 and 2 have been occupied only relatively recently by merlins (during the last several years).

Kestrel

8.66 Observations indicated the presence of two pairs of kestrels within the study area however breeding was not confirmed and may not have taken place within the study area (within a 2 km extent). Kestrel Pair 1 was located approximately 1.5 - 2 km west of the Proposed Development and Pair 2 the same distance to the south.

Buzzard

8.67 Observations indicated the presence of four pairs of buzzards within the study area and breeding was confirmed at two locations. The confirmed nest locations ("Location 1" and "Location 2") are shown in Figure 8.13 (Confidential) and details are provided in Technical Appendix 8.14 (Confidential). The nest locations were c. 700 m (Location 1) and c. 1.0 km (Location 2) from the Proposed Development.

Sparrowhawk

8.68 Observations indicated the presence of one pair of sparrowhawks within the study area and breeding was confirmed. The confirmed nest location is shown in Figure 8.13 (Confidential) and details are provided in Technical Appendix 8.14 (Confidential).

Future Baseline

8.69 A consideration of the likely future baseline conditions for local bird communities (using professional judgement and if relevant taking into account recent historical trends) indicates that in general the future bird communities are likely to be similar to the contemporary characterisation.

Hen Harrier and Merlin

8.70 In relation to the two qualifying species for the Antrim Hills SPA (hen harrier and merlin) an assessment of the current baseline and relatively recent historical situation (up to 15 years) along with other relevant factors (such as local habitat conditions during the same period) indicates no likely future change in the status of these two species within the study area at least in the medium term.

Likely Significant Effects

General Remarks

- 8.71 The assessment of likely significant effects has been carried out principally with reference to published research on the distribution of birds around upland wind farms¹⁷ and the impacts of wind farms on birds during construction¹⁸ - hereafter these are collectively referred to as “the Pearce-Higgins research”. Other relevant published research and guidance is referenced as necessary.
- 8.72 The Pearce-Higgins research has suggested that the main adverse effect of wind farms on birds (excluding raptor species) is probably displacement due to disturbance during construction and that wind farm operation is unlikely to have a significant effect on local breeding bird populations. The research also suggested that there are potential beneficial effects of wind farm construction for some passerine species.

Construction Effects

- 8.73 The potential construction effects which might occur as a result of the Proposed Development are summarised in Table 8.15 and described further under the relevant headings below.

Red Grouse

- 8.74 Red grouse is a Red-listed Species of Conservation Concern in Ireland and therefore should be considered to be of high sensitivity.
- The potential construction effect on red grouse is principally displacement of birds due to disturbance by the construction works as they proceed across the Site.
 - The observed distribution of red grouse within the study area indicates that any displacement of birds by construction activity is likely to be relatively minor.
 - The Pearce-Higgins research indicates that the effect would be temporary with grouse numbers recovering after construction.
 - Therefore the effect is unlikely to be significant for the local red grouse population.

Curlew

- 8.75 Curlew is a Red-listed Species of Conservation Concern in Ireland and therefore should be considered to be of high sensitivity.

¹⁷ Pearce-Higgins, J.W. *et al.* (2009): The distribution of breeding birds around upland wind farms (Journal of Applied Ecology 46)

¹⁸ Pearce-Higgins, J.W. *et al.* (2012): Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis (Journal of Applied Ecology 49)

- The potential construction effect on curlew is possible displacement of birds due to disturbance by the construction works as they proceed across the Site and the effect is likely to be permanent.
- However the observed status and location of curlew within the study area indicates that displacement of birds by construction activity is highly unlikely to occur.

Snipe

8.76 Snipe is a Red-listed Species of Conservation Concern in Ireland and therefore should be considered to be of high sensitivity.

- The potential construction effect on snipe is possible displacement of birds due to disturbance by the construction works as they proceed across the Site and the effect is likely to be permanent.
- The Pearce-Higgins research indicates a 53 % decline in snipe densities on wind farms during construction and also possible avoidance that extends up to 400 m from turbine locations resulting in a predicted 48 % reduction in snipe breeding density within a 500 m extent of turbine arrays post-construction and the effect is likely to be permanent.
- Considering this research and the numbers and distribution of breeding snipe within the study area then there is potential for the displacement of up to two pairs of snipe within a 500 m extent of the Proposed Development.
- The Northern Ireland snipe population has declined c. 78% since the 1980's up to 2013 when there were estimated to be 1,123 breeding pairs¹⁹ however further decline since then is likely and the displacement of two breeding pairs is likely to be significant for the local snipe population but would not be significant at the regional (Northern Ireland) population level.

Moorland Passerines (Breeding)

8.77 In general, moorland passerines should be considered to be of low sensitivity, with the caveat that nesting birds are protected under the general provisions of the Wildlife Order.

- Several of the passerine species found during the baseline surveys (whinchat, meadow pipit and grey wagtail) are Red-listed Species of Conservation Concern and several other species (skylark, sand martin, wheatear, willow warbler and linnet) are Amber-listed however all these species are widely distributed and in some cases (e.g. willow warbler) abundant locally and at a regional level²⁰. Other passerine species found within the study area are not currently of conservation concern (Green-listed).

¹⁹ Colhoun, K., Mawhinney, K and Peach, W.J (2015) Population estimates and changes in abundance of breeding waders in Northern Ireland up to 2013 (Bird Study 62, 394 - 403)

²⁰ Bird Atlas 2007 - 2011 (BTO)

- It is also noted that SNH guidance indicates that breeding upland passerine species should not generally be of concern in relation to wind farm developments²¹. For two passerine species (meadow pipit and wheatear) the Pearce-Higgins research indicates a reduction in densities within a 500 m extent from turbine arrays however the reasons for this were unclear and subsequent analysis found little evidence for consistent population declines in wheatear populations at wind farm sites.
- The Pearce-Higgins research has also suggested potential positive effects of wind farm construction on skylarks, meadow pipits and stonechats and it is suggested that vegetation disturbance during construction results in changes to the vegetation that favour these species.
- Considering the above factors then construction displacement effects are unlikely to be significant for local populations of breeding moorland passerines and for several species there is likely to be a significant medium to long term beneficial effect.

Golden Plover (winter)

8.78 Golden plover is a Red-listed Species of Conservation Concern in Ireland and therefore should be considered to be of high sensitivity however the significance threshold for wintering populations is significantly lower than for breeding populations.

- The potential construction effect on wintering golden plovers is possible temporary displacement of birds due to disturbance by the construction works as they proceed across the Site.
- However the observed numbers and distribution of golden plovers within the study area indicates that any displacement of birds by construction activity is likely to be relatively minor therefore the effect is highly unlikely to be significant for the local wintering golden plover population.

Hen Harrier

8.79 Hen harrier is an Amber-listed Species of Conservation Concern in Ireland and the most recent published information for the UK indicates a population of 26 territorial pairs in Northern Ireland²². Hen harrier is also a qualifying species for the Antrim Hills SPA and therefore should be considered to be of high sensitivity.

Breeding

- The potential construction effect on breeding harriers is temporary displacement of nesting birds due to the construction works as they proceed across the Site.

²¹ SNH (2006): Assessing the significance of impacts of on-shore wind farms on birds out-with designated areas (Guidance Note, July 2006)

²² Eaton, M and Holling, M. (2020): Rare breeding birds in the UK in 2018 (British Birds 113, 737 – 791)

- The indicated upper limit of disturbance for nesting hen harriers is in the range of 500 - 750 m around the nest site²³. However the observed baseline and recent historical breeding status of hen harriers within the study area indicate that it is highly unlikely birds would be nesting within the near vicinity of the Proposed Development during the construction phase therefore disturbance of nest sites is highly unlikely to occur.

Roosting

- The potential construction effect on roosting harriers is temporary displacement of roosting birds due to the construction works as they proceed across the Site.
- The upper limit of disturbance for roosting hen harriers is likely to be similar to that for nest sites. The observed baseline and recent historical status of roosting harriers within the study area indicate that it is highly unlikely there would be regular roosting within the vicinity of the Proposed Development during the construction phase therefore disturbance of roost sites is highly unlikely to occur.

Foraging

- The potential construction effect on foraging harriers is temporary displacement of foraging birds due to the construction works as they proceed across the Site.
- The upper limit of disturbance for foraging harriers is likely to be similar to that for nest sites and roosting birds. However the observed levels of harrier foraging activity within the study area indicate that construction displacement effects on foraging harriers are highly unlikely to be significant.

Merlin

8.80 Merlin is an Amber-listed Species of Conservation Concern in Ireland and the Northern Ireland breeding population is estimated to be in the region of 25 - 40 pairs²⁴. Merlin is also a qualifying species for the Antrim Hills SPA and therefore should be considered to be of high sensitivity.

- The potential construction effect on merlins is temporary displacement of nesting birds due to the construction works as they proceed across the Site.
- The indicated upper limit of disturbance for nesting merlins is in the range of 300 - 500 m²⁵ with the caveat that if previously exposed to relatively innocuous disturbance this species can develop a tolerance to relatively high

²³ Ruddock, M and Whitfield, D.P. (2007): A Review of Disturbance Distances in Selected Bird Species (Natural Research Ltd Report to Scottish Natural Heritage)

²⁴ Northern Ireland Bird Report XVIII (2007 / 2008)

²⁵ Ruddock, M and Whitfield, D.P. (2007): A Review of Disturbance Distances in Selected Bird Species (Natural Research Ltd Report to Scottish Natural Heritage)

levels of at least some forms of human disturbance (so long as there is no direct interference with the nest site) and merlins nesting within the study area will certainly have been exposed to occasional human disturbance due to the location of the nest sites close to a public road.

- Considering the above factors and also the locations of the confirmed merlin nest sites within the study area then any disturbance due to construction activity is unlikely to be significant.

Buzzard

8.81 Buzzard has a favourable conservation status in Ireland (Green-listed). The all-Ireland breeding population has been estimated at 3,312 pairs (of which about half are in Northern Ireland) however the population is still expanding in size and range²⁶. Buzzards should therefore be considered to be of relatively low sensitivity, with the caveat that nesting birds are protected under Schedule 1 of the Wildlife Order.

- The potential construction effect on buzzards is temporary displacement of nesting birds due to the construction works as they proceed across the Site.
- There is no published upper disturbance limit for nesting buzzards however this is likely to be similar to other medium sized raptor species for which published estimates are available therefore in the region of 500 m.
- Considering the locations of the confirmed buzzard nest sites within the study area then disturbance due to construction activity is unlikely to occur.

Table 8.15: Summary of Potential Construction Effects

Receptor	Potential Effect	Duration	Likelihood / Significance
Red grouse	Displacement	Temporary short term	Unlikely to be significant
Curlew	Displacement of breeding pairs	Permanent	Highly unlikely to occur
Snipe	Displacement of up to two breeding pairs	Permanent	Likely to be significant for the local snipe population
Moorland passerines	Displacement	Permanent	Unlikely to be significant for local populations of moorland passerines
Moorland passerines	Habitat modifications (beneficial effect)	Temporary short and medium to long term	Likely to be significant for local populations of some passerine species

²⁶ Nagle, T. *et al.* (2014): Habitat and diet of re-colonising common buzzards *Buteo buteo* in County Cork (Irish Birds 10)

Receptor	Potential Effect	Duration	Likelihood / Significance
Golden plover (winter)	Displacement	Temporary short term	Highly unlikely to be significant
Hen harrier	Displacement of breeding pairs	Temporary short term	Highly unlikely to occur
Hen harrier	Displacement of roosting birds	Temporary short term	Highly unlikely to occur
Hen harrier	Displacement of foraging birds	Temporary short term	Highly unlikely to be significant
Merlin	Displacement of breeding pairs	Temporary short term	Unlikely to be significant
Buzzard	Displacement of breeding pairs	Temporary short term	Unlikely to occur

Operational Effects

8.82 The potential operational effects which might occur as a result of the Proposed Development are summarised in Table 8.16 and described further under the relevant headings below.

Golden Plovers (winter)

8.83 The potential operational effect on wintering golden plovers is collision mortality.

- However golden plovers are fast and agile fliers and are relatively small in size and therefore are not likely to be at especially high risk of collisions. Considering also the relatively small numbers of golden plovers observed within the study area then it is highly unlikely that collisions would be significant for the local wintering golden plover population.

Hen Harrier

8.84 The potential operational effects on hen harriers are displacement of foraging birds and collision mortality.

Foraging

- The Pearce-Higgins research indicates potential displacement of foraging hen harriers due to avoidance of wind farms and the effect can extend up to 250 m resulting in a predicted 52 % reduction in flight activity within a 500 m extent of the turbine array.
- However considering the relatively low levels of foraging activity observed within the study area (and also the observed baseline and recent historical breeding status of hen harriers within the study area) then it is unlikely that

the predicted reduction in hen harrier flight activity would have any significant adverse effects on the local hen harrier population or on the regional conservation status of the species.

- It is also noted that the baseline observations included four observations of harriers foraging within the turbine array of the existing Gruig Wind Farm (on one occasion to within c. 50 m of a turbine) and including one observation of a successful prey capture within the turbine array.

Collisions

- The Collision Risk Model (Technical Appendix 8.12) indicates a collision risk for hen harrier equivalent to one bird every 41 years. This is a very low collision risk and it is therefore highly unlikely that there would be any significant adverse effects on the local hen harrier population or on the regional conservation status of the species.

Merlin

8.85 The potential operational effects on merlins are displacement of foraging birds and collision mortality.

Foraging

- The Pearce-Higgins research does not indicate any specific displacement effects for merlins. The species has been shown to be adversely affected by afforestation as this significantly reduces the amount of open ground available for foraging²⁷ however this effect is highly unlikely to be replicated by the Proposed Development, which is unlikely to have any significant adverse effect on the density of small moorland passerines (the merlin's principal prey) and may even have a significant beneficial effect for local populations of some passerines.
- It can probably be assumed that there is likely to be some degree of displacement however this is likely to be relatively minor in nature. Considering these factors and the foraging behaviour and range of this species then it is highly unlikely that displacement of foraging birds around the turbine array would have any significant adverse effects on the local merlin population or on the regional conservation status of the species.

Collisions

- There were an insufficient number of observations to justify using the Collision Risk Model for this species however the small size and flight behaviour of merlins would suggest they are likely to be at relatively low risk of collisions compared with most other raptor species.

²⁷ Rebecca, G *et al.* (2022) Occupancy and productivity at merlin breeding areas in North-east Scotland in relation to land use: implications for conservation management (British Birds 115)

Peregrine

8.86 Peregrine has a favourable conservation status in Ireland (Green-listed) and the most recent published information for the UK indicates an (estimated) population of at least 77 territorial pairs in Northern Ireland²⁸. The potential operational effects on peregrines are displacement of foraging birds and collision mortality.

Foraging

- Published guidance indicates a core foraging range for peregrines of 2 km however foraging up to a maximum of 18 km from the nest has been recorded in Scotland²⁹ and up to at least ten kilometres in Northern Ireland³⁰. It can therefore be assumed that foraging peregrines are likely to travel significantly beyond the indicated core range. Peregrines also forage over a very wide range of habitats including even urban areas and the open sea (anywhere where their principal prey of small and medium sized birds is available).
- The Pearce-Higgins research does not indicate any specific displacement effects for peregrines. Although it can probably be assumed that there is likely to be some degree of displacement, the baseline observations (there were five observations of peregrines flying within the existing Gruig Wind Farm turbine array) might indicate that displacement is likely to be relatively minor or moderate in nature.
- Considering these observations and the foraging behaviour and range of this species then it is highly unlikely that displacement of foraging birds around the turbine array (even assuming a moderate level of displacement) would have any significant adverse effects on the local peregrine population or on the regional conservation status of the species.

Collision Risk

- The Collision Risk Model (Technical Appendix 8.12) indicates a collision risk for peregrine equivalent to one bird every 74 years. This is a very low collision risk and it is therefore highly unlikely that there would be any significant adverse effects on the local peregrine population or on the regional conservation status of the species.

Buzzard

8.87 The potential operational effects on buzzards are displacement of foraging birds and collision mortality.

²⁸ Eaton, M (2021): Rare breeding birds in the UK in 2019 (British Birds 114, 646 - 704)

²⁹ SNH (2016) Assessing Connectivity with Special Protection Areas (Guidance Note June 2016); NIEA guidance given in wind farm consultation responses

³⁰ personal observations

Foraging

- The Pearce-Higgins research indicates potential displacement of foraging buzzards due to avoidance of wind farms and the effect can extend up to 500 m resulting in a predicted 41 % reduction in flight activity within a 500 m extent of the turbine array however the significance of this effect needs to be assessed in the context of other habitats that are likely to be available to the birds and also the favourable conservation status and very widespread distribution of this species in Northern Ireland and on the island of Ireland as a whole³¹.
- Buzzards forage over a wide range of habitats including moorland and upland grassland habitats (such as those found within the study area), agricultural habitats (including improved grasslands), woodland edge and commercial forestry habitats (including newly harvested areas). During the baseline period buzzards were observed foraging in association with all of the above habitats within the wider area around the Proposed Development and availability of foraging habitat is unlikely to be a significant constraint for the birds.
- It is also noted that during the baseline surveys a significant amount of buzzard foraging activity was observed within the turbine array of the existing Gruig Wind Farm. Considering all these factors then it is unlikely that the predicted foraging displacement would have any significant adverse effects on the local buzzard population or on the regional conservation status of the species.

Collision Risk

- The Collision Risk Model (Technical Appendix 8.12) indicates a collision risk for buzzard equivalent to one bird every eight years. The collision risk needs to be assessed in the context of breeding productivity and also the favourable conservation status and very widespread distribution of this species in Northern Ireland and on the island of Ireland as a whole.
- Breeding productivity in Northern Ireland has been estimated to average 1.95 young per successful pair³² and a study in the Republic of Ireland recorded an average of 2.61 young fledging per successful pair³³. Observations of breeding productivity within the study area have been consistent with these published figures.
- Buzzards are widely distributed locally and the numbers found within the study area are typical of the densities found in many areas of County Antrim.

³¹ Bird Atlas 2007-2011 (BTO)

³² Rooney, E and Montgomery, W.I. (2013) Diet diversity of the common buzzard *Buteo buteo* in a vole-less environment (Bird Study 60)

³³ Nagle, T. *et al.* (2014): Habitat and diet of re-colonising common buzzards *Buteo buteo* in County Cork (Irish Birds 10)

Taking all these factors into account then it is unlikely that the predicted number of collisions would have a significant adverse effect on the local buzzard population and highly unlikely there would be a significant adverse effect on the regional conservation status of the species.

Kestrel

8.88 The potential operational effects on kestrels are displacement of foraging birds and collision mortality.

Foraging

- The Pearce-Higgins research does not indicate any specific displacement effects for kestrels and published guidance indicates that kestrels probably avoid wind turbines to a significantly lesser extent than other raptor species³⁴.
- It is also noted that during the baseline surveys a significant amount of kestrel foraging activity was observed within the turbine array of the existing Gruig Wind Farm. Considering these factors then it is highly unlikely that displacement of foraging birds would have any significant adverse effects on the local kestrel population or on the regional conservation status of the species.

Collision Risk

- The Collision Risk Model (Technical Appendix 8.12) indicates a collision risk for kestrel equivalent to one bird every six years. The collision risk needs to be assessed in the context of breeding productivity (typically about three young per successful pair³⁵) and very widespread distribution of kestrels in Northern Ireland and on the island of Ireland as a whole³⁶. Taking these factors into account then it is unlikely that the predicted number of collisions would have a significant adverse effect on the local kestrel population and highly unlikely that there would be a significant adverse effect on the regional conservation status of the species.

Table 8.16: Summary of Potential Operational Effects

Receptor	Potential Effect	Duration	Likelihood / Significance
Golden plover (winter)	Collision mortality	Temporary long term	Highly unlikely to be

³⁴ SNH (2016): Avoidance rates for the SNH onshore wind farm Collision Risk Model (SNH Guidance Note, October 2016)

³⁵ personal observations

³⁶ Bird Atlas 2007-2011 (BTO)

Receptor	Potential Effect	Duration	Likelihood / Significance
			significant
Hen harrier	Displacement of foraging birds	Temporary long term	Unlikely to be significant
Hen harrier	Collision mortality	Temporary long term	Highly unlikely to be significant
Merlin	Displacement of foraging birds	Temporary long term	Highly unlikely to be significant
Merlin	Collision mortality	Temporary long term	Highly unlikely to be significant
Peregrine	Displacement of foraging birds	Temporary long term	Highly unlikely to be significant
Peregrine	Collision mortality	Temporary long term	Highly unlikely to be significant
Buzzard	Displacement of foraging birds	Temporary long term	Unlikely to be significant
Buzzard	Collision mortality	Temporary long term	Highly unlikely to be significant
Kestrel	Displacement of foraging birds	Temporary long term	Highly unlikely to be significant
Kestrel	Collision mortality	Temporary long term	Unlikely to be significant

Decommissioning Effects

8.89 The potential decommissioning effects which might occur as a result of the Proposed Development are summarised in Table 8.17. In general, decommissioning effects are likely to be similar to construction effects but of a lower magnitude and are less likely to be significant.

Table 8.17: Summary of Potential Decommissioning Effects

Receptor	Potential Effect	Duration	Likelihood / Significance
Red grouse	Displacement	Temporary short term	Highly unlikely to be significant
Snipe	Displacement of breeding pairs	Temporary short term	Highly unlikely to occur
Moorland passerines	Displacement	Temporary short term	Highly unlikely to occur
Golden plover (winter)	Displacement	Temporary short term	Highly unlikely to occur
Hen harrier	Displacement of breeding pairs	Temporary short term	Highly unlikely to occur

Receptor	Potential Effect	Duration	Likelihood / Significance
Hen harrier	Displacement of roosting birds	Temporary short term	Highly unlikely to occur
Hen harrier	Displacement of foraging birds	Temporary short term	Highly unlikely to be significant
Merlin	Displacement of breeding pairs	Temporary short term	Unlikely to occur
Buzzard	Displacement of breeding pairs	Temporary short term	Highly unlikely to occur

Likely Effects on Designated Conservation Areas

8.90 The Proposed Development is immediately adjacent to the local part of the Antrim Hills SPA and within relatively close proximity of the Slieveanorra ASSI. The SPA and the ASSI overlap extensively and both are designated for hen harrier and merlin therefore they are considered together. The potential effects of the Proposed Development on the SPA and the ASSI are summarised in Table 8.18 and described further under the relevant headings below. In respect of the SPA a Habitat Regulations Assessment has also been completed and is provided separately (Technical Appendix 8.13).

Hen Harrier

8.91 The potential effects on hen harriers within the adjacent part of the SPA / ASSI are temporary displacement of nesting birds, displacement of foraging birds and collision risk.

- Considering the observed baseline and recent historical status of hen harriers within the study area (including the adjacent part of the SPA / ASSI), the relatively low levels of foraging activity observed within the study area and the likely future baseline then it is unlikely that the Proposed Development would have any significant adverse effects on the local part of the SPA / ASSI and by extension on the wider SPA / ASSI hen harrier population.

Merlin

8.92 The potential effects on merlins within the adjacent part of the SPA / ASSI are temporary displacement of nesting birds, displacement of foraging birds and collision risk.

- Considering the observed baseline and recent historical status of merlins within the study area (including the adjacent part of the SPA / ASSI) and the likely future baseline then it is unlikely that the Proposed Development would have any significant adverse effects on the local part of the SPA / ASSI and by extension on the wider SPA / ASSI merlin population.

Table 8.18: Summary of Potential Effects on Designated Conservations Areas

Qualifying Species	Potential Effect	Duration	Likelihood / Significance
Hen harrier and merlin	Displacement of breeding pairs	Temporary short term	Unlikely to occur
Hen harrier and merlin	Displacement of foraging birds	Temporary short term	Highly unlikely to be significant
Hen harrier and merlin	Collision mortality	Temporary long term	Highly unlikely to be significant

Mitigation

8.93 Proposed mitigation is summarised in Table 8.19 and described further under the relevant headings below. Full details of the Ornithology Mitigation Strategy (OMS) and Ornithology Management and Monitoring Plan (OMMP) would be provided in reports prior to the start of construction.

Habitat Management

8.94 It is proposed to implement a programme of long term habitat management to compensate for the potential displacement of up to two pairs of snipe. The habitat management area extends over a contiguous block of 80.25 ha. A very significant portion of the total area (28.11 ha) is located > 400 m from any turbine locations and thereby is beyond the upper limit of any possible displacement effects. *The habitat management area (including the portion located > 400 m from turbines) is considered to be of more than adequate size to compensate for the potential displacement effects on the local snipe population.*

8.95 The habitat management is to follow the Northern Ireland Environmental Farming Scheme species-specific guidance for breeding waders³⁷. The management prescriptions therefore are to include appropriate restrictions on grazing, seasonal control of water levels (by way of a range of measures including drain blocking) and other measures including control of soft rush as necessary. Full details of the proposed measures are provided in the outline Habitat Management Plan (oHMP) in Technical Appendix 6.2 and in Figure 6.6 (Habitat Management Area).

³⁷ DAERA-NIEA, RSPB *Environmental Farming Scheme Species-Specific Guidance – managing habitat for breeding waders* Version 1.3

Ornithology Mitigation Strategy

8.96 It is proposed that no development activity will take place on the Site between 1 March and 31 August in any year until an Ornithology Mitigation Strategy (OMS) has been prepared by a suitably experienced ornithologist and approved by the Planning Authority.

Ornithology Management and Monitoring Plan

8.97 It is proposed that no development activity will take place on the Site until an Ornithology Management and Monitoring Plan (OMMP) has been prepared by a suitably experienced ornithologist and approved by the Planning Authority.

Table 8.19: Summary of Mitigation

Mitigation	Receptor	Reason	Duration
Habitat management	Snipe	To compensate for the potential displacement of up to two pairs of snipe	Long term during the life of the Proposed Development
Ornithology Mitigation Strategy	Breeding birds (including snipe)	To protect breeding birds during the construction phase	Immediately prior to and during the construction phase if this is during the bird breeding season (1 March to 31 August inclusive)
Ornithology Management and Monitoring Plan	Snipe (and other breeding birds)	To ensure implementation of the long term mitigation (habitat management) and also to monitor the effects of the Proposed Development on local bird communities	During the construction phase and long term during the life of the Proposed Development

Residual Effects

8.98 The likely significant effects of the Proposed Development on local bird communities and any residual effects after the implementation of the proposed mitigation measures are summarised in Table 8.20.

Table 8.20: Summary of Residual Effects

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Permanent displacement of up to	Provision of an appropriate area of	By way of the Habitat Management Plan and	No residual effect

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
two pairs of snipe	suitable compensatory habitat	the Ornithology Management and Monitoring Plan	

Cumulative Effects

General Remarks

8.99 In line with the current SNH guidance³⁸ potential cumulative effects are assessed for Species of Conservation Concern that are regularly occurring in significant numbers within the study area. The guidance indicates that a cumulative effect should be considered to be of concern when it would adversely affect the favourable conservation status of a species (or prevent a species from recovering to favourable conservation status) at the regional or national level.

Wind Farms

8.100 Information (including location co-ordinates) for wind farms within 30 km of the Proposed Development has been provided by the Applicant. Most of the wind farms could not reasonably be considered to be in the same geographical vicinity as the Proposed Development and only wind farms located within 10 km are considered in the assessment of cumulative effects. Within this area there are five wind farms, all of which are operational (Corkey Wind Farm and Corkey Wind Farm Repowering are counted as the same for practical purposes). Details of wind farms located within 10 km are summarised in Table 8.21.

Table 8.21: Summary of Wind Farms within 10 km

Wind Farm Name	No. Turbines	Location	Status
Altaveedan Wind Farm	9	6.0 km to north	operational
Corkey Wind Farm	10	1.0 km to north	operational
Corkey Wind Farm Repowering	5	1.0 km to north	Consented (to replace Corkey Wind Farm)
Elginny Hill	9	9.0 km to southeast	operational
Gruig Wind Farm	10	0.0 km (adjacent)	operational
Rathsherry Wind Farm	9	8.0 km to southeast	operational

³⁸ SNH (2018) Assessing the cumulative impacts of onshore wind farms on birds (SNH Guidance Note, August 2018)

Single Turbines

8.101 Information (including location co-ordinates) for single turbines within 5 km of the Proposed Development has been provided by the Applicant. Within this area there are seven single turbines all bar one of which are operational. Details of single turbines located within 5 km are summarised in Table 8.22.

Table 8.22: Summary of Single Turbines within 5 km

Single Turbine No.	Co-ordinates (X, Y)	Location	Status
1	310012, 423254	2.3 km to northwest	operational
2	309917, 422277	1.5 km to northwest	operational
3	310616, 422923	1.9 km to north	operational
4	310169, 419876	1.0 km to west	operational
5	311618, 418306	1.3 km to southwest	operational
6	311777, 418311	1.3 km to southwest	operational
7	313347, 417182	2.7 km to southeast	consented

Assessment of Likely Cumulative Effects

8.102 The potential cumulative effects which might occur as a result of the Proposed Development in combination with other wind farms and single turbines in the vicinity of the relevant receptor species are summarised in Table 8.23 and described further under the relevant species headings below.

Red Grouse

8.103 The Pearce-Higgins research indicates that effects on red grouse are likely to be limited to temporary displacement during construction and the operation of wind farms is unlikely to have a significant effect.

- It is therefore unlikely there would be any cumulative effects due to the two operational wind farms in the relatively near vicinity of the red grouse locations (Gruig Wind Farm and Corkey Wind Farm).
- The consented Corkey Wind Farm (repowering) is within the wider study area (within 2 km) however it is not particularly close to any of the red grouse locations (not closer than c. 500 m and average c. 1.75 km distant) therefore even if this wind farm is constructed at the same time as the Proposed Development it is unlikely there would be a significant cumulative effect on the local red grouse population.
- None of the single turbines are close enough to the red grouse locations to be of concern.

Snipe

8.104 As with red grouse, cumulative effects on snipe are likely to be primarily construction related although the displacement of any birds would be expected to be permanent.

- The consented Corkey Wind Farm (repowering) is within the wider study area (within 2 km) however it is not particularly close to any of the snipe locations (significantly beyond the 400 m likely upper displacement distance for snipe) and a cumulative effect due to the construction of this wind farm is therefore unlikely.
- The operational Gruig Wind Farm is in relatively close proximity to the four snipe locations (in the range of 250 m to 650 m from the estimated territory centres and with three of the territories within c. 500 m) however as this wind farm is long term operational (year 16) there are unlikely to be any additional displacement effects.
- None of the single turbines are close enough to the snipe locations to be of concern.

Hen Harrier

8.105 The potential cumulative effects on hen harriers relate principally to additional displacement effects on foraging birds.

Foraging

- Two operational wind farms (Gruig Wind Farm and Corkey Wind Farm) and five operational single turbines (nos. 2, 3, 4, 5 and 6) are within the wider study area (within 2 km).
- The baseline hen harrier observations and an assessment of the habitat within the wider study area indicates that hen harriers are likely to forage in the vicinity (within a 500 m extent) of both wind farms and also in the vicinity of four of the five single turbines.
- The Pearce-Higgins research therefore indicates potential additional displacement of foraging hen harriers due to avoidance of the two wind farms and the four single turbines with the effect extending up to 250 m and resulting in a predicted 52 % reduction in flight activity within a 500 m extent of the turbines.
- However considering the relatively low levels of foraging activity observed within the study area (and also the observed baseline and recent historical status of hen harriers within the study area) then it is unlikely that the additional (cumulative) reduction in hen harrier foraging activity would have any significant adverse effects on the local hen harrier population or on the regional conservation status of the species.

- The three other operational wind farms (Altaveedan Wind Farm, Elginny Hill Wind Farm and Rathsherry Wind Farm) are too far away to be of concern in relation to the local hen harrier population.

Merlin

8.106 The potential cumulative effects on merlins relate principally to additional construction disturbance of the breeding locations and additional displacement effects on foraging birds.

Breeding

- The consented Corkey Wind Farm (repowering) is within the wider study area (within 2 km) however it is not particularly close to the two confirmed merlin breeding locations (not closer than 2 km) therefore the construction of this wind farm is highly unlikely to cause any additional disturbance effects.
- The entrance location for the operational Gruig Wind Farm is in relatively close proximity (within 630 m to 800 m) from the two confirmed merlin breeding locations. The wind farm is long term operational (year 16) and there has been no indication of any adverse effects on the merlin breeding locations despite their relatively close proximity to the wind farm entrance.

Foraging

- The baseline merlin observations and an assessment of the habitat within the wider study area indicates that merlins are likely to forage in the vicinity (within a 500 m extent) of both operational wind farms (Gruig Wind Farm and Corkey Wind Farm) and also in the vicinity of the five single turbines within the wider study area (within 2 km).
- Most of the single turbines are only relatively recently operational however both the wind farms are long term operational (16 years for Gruig Wind Farm and >20 years for Corkey Wind Farm) and the baseline and historical information for merlins indicates that there have been no adverse effects (e.g. reduced site occupancy or reduced breeding success) within the study area.
- Considering these observations it is unlikely that any additional (cumulative) reduction in merlin foraging activity would have any significant adverse effects on the local merlin population or on the regional conservation status of the species.

Antrim Hills SPA

8.107 Potential cumulative effects on the local part of the Antrim Hills SPA (and by extension on the wider SPA) are considered in relation to Altaveedan Wind Farm, Corkey Wind Farm (operational and repowering) and Gruig Wind Farm. Elginny Hill Wind Farm and Rathsherry Wind Farm are too far away from the local part of the SPA to be of concern.

8.108 The potential cumulative effects on the SPA are essentially the same as those already described for hen harrier and merlin, which are the two key features (selection species) for the SPA site. Considering the baseline observations already described for the study area (including observations from the local part of the SPA) and also the published guidance on assessing connectivity with SPAs for the relevant selection species³⁹ then there is no indication of any likely significant adverse cumulative effects on the local part of the SPA and by extension on the SPA as a whole - the reasons for this are detailed under the relevant species headings below.

Hen harriers

- Recent hen harrier nest locations (occupied within the last five years) within the local part of the SPA (within 5 km of the Proposed Development) are detailed in Technical Appendix 8.14. During the last five years hen harriers have been confirmed nesting at two locations within the local part of the SPA however neither of the locations was closer than 4.0 km from the Proposed Development or closer than 3.0 km from any of the other wind farms considered as part of the assessment of likely cumulative effects.
- The SNH guidance for connectivity between wind farm developments and an SPA selection species / key feature indicates an upper distance of 2 km for hen harriers (confirmed nest locations). Based on the recent baseline observations of hen harrier activity (and also considering the likely future baseline of “no change”) it is highly unlikely any of the wind farms considered will have significant connectivity with hen harrier nesting locations within the local part of the SPA in the short to medium term.

Merlins

- The SNH guidance for connectivity between wind farm developments and an SPA selection species / key feature indicates an upper distance of 5 km for merlins (confirmed nest locations). Based on the recent baseline observations of merlin activity (and also considering the likely future baseline of “no change” in the medium term) it is likely that two of the wind farms considered in the assessment of cumulative effects (Corkey Wind Farm and Gruig Wind Farm) have connectivity with the confirmed merlin nest locations within the local part of the SPA. However both these wind farms are long-term operational and during this time there has been no indication of any significant adverse effects on the local merlin population.

³⁹ SNH (2016) Assessing Connectivity with Special Protection Areas (Guidance Note June 2016)

Table 8.23: Summary of Cumulative Effects

Receptor	Potential Effect	Duration	Likelihood / Significance
Red grouse	Cumulative construction effects	Temporary short term	Unlikely to be significant
Snipe	Cumulative construction effects	Permanent	Unlikely to occur
Hen harrier	Additional displacement of foraging birds	Temporary long term	Unlikely to be significant
Merlin	Additional displacement of breeding pairs	Temporary short term	Highly unlikely to occur
Merlin	Additional displacement of foraging birds	Temporary long term	Unlikely to be significant
SPA (hen harrier and merlin)	Cumulative effects on the SPA	Temporary long term	No significant effect

Summary

- 8.109 The likely significant effects and residual effects which might occur as a result of the Proposed Development are summarised in Table 8.24. With the exception of the potential displacement of up to two pairs of breeding snipe there are no likely significant effects on bird communities. Assuming implementation of the proposed mitigation measures as described then there are no remaining residual effects and no likely cumulative effects have been identified.
- 8.110 Mitigation is to include a programme of long term habitat management over an extensive area (in total 80.25 ha, of which 28.11 ha is beyond 400 m from turbines) to compensate for the potential displacement of up to two pairs of snipe - full details of these measures are provided in Technical Appendix 6.2: OHMP and in Figure 6.6 (Habitat Management Area) In addition, there is to be an Ornithology Mitigation Strategy (OMS) to protect breeding birds during the construction phase and an Ornithology Management and Monitoring Plan (OMMP) to ensure implementation of the long term habitat management measures and to monitor the effects of the Proposed Development on local bird communities.

Table 8.24: Summary of Likely Significant Effects and Residual Effects

Receptor	Likely Significant Effects	Mitigation	Residual Effects
Red grouse	No likely significant effects	-	-
Snipe	Displacement of up to two breeding pairs	Provision of an appropriate area of suitable compensatory habitat to be implemented by way of the Habitat Management Plan and the Ornithology Management and Monitoring Plan	No residual effects
Curlew	No likely significant effects	-	-
Golden plover (winter)	No likely significant effects	-	-
Hen harrier	No likely significant effects	-	-
Merlin	No likely significant effects	-	-
Peregrine	No likely significant effects	-	-
Kestrel	No likely significant effects	-	-
Buzzard	No likely significant effects	-	-
Moorland passerines (breeding)	No likely significant effects	-	-
Moorland passerines (winter)	No likely significant effects	-	-
Cumulative effects	No likely significant effects	-	-

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