



Chapter 9

Ornithology

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Chapter 9

Ornithology

9.1 Executive summary

1. This Chapter considers the potential effects of the proposed Development 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 and operation of the proposed Development are explained and an assessment is made with regards the significance of these effects.
2. The assessment is structured around the consideration of potential effects, including cumulative effects of construction and operation of the proposed Development upon those ornithological receptors identified during survey work.
3. Desk-based studies and field surveys were carried out in and around the proposed Development over respective 'study areas' to establish baseline conditions and the species and populations present.
4. It was possible to 'scope out' the effects on a number of species of high Nature Conservation Importance by virtue of their ecology, absence, distance from the proposed Development, small numbers, low levels of activity and the nature and location of this activity.
5. Three bird species were included in the assessment, goshawk, peregrine and golden plover. All these species were considered of high Nature Conservation Importance due to peregrine and goshawk being listed on Schedule 1 (Wildlife and Countryside Act 1981, as amended by the Nature Conservation (Scotland) Act 2004) and peregrine and golden plover as Annex I (Birds Directive).
6. Habitat loss arising from the construction of tracks, borrow pits and turbine bases is unlikely to result in adverse impacts upon any bird species. Any impacts will be negligible and not significant. Population reductions due to habitat loss, displacement and/or collision mortality are also likely to be minimal. Any impacts will be negligible and not significant for all bird species. Due to a relatively small proportion of available habitat in the area being removed no mitigation is required.
7. The contribution of adverse effects accrued by the proposed Development to regional populations would be undetectable and so cumulative effects of the proposed Development with existing and planned windfarm developments in the region are judged as being unlikely to have a significant effect on existing bird populations. Overall, it is concluded that construction and operation of the proposed Development would not have a significant effect on birds under the terms of the EIA Regulations.

9.2 Introduction

8. This Chapter describes the methods used to establish the bird interest within the proposed Development and surrounding area, together with the process used to determine the Nature Conservation Importance of the bird populations present. It explains the ways in which birds may be affected by the proposed Development and assesses the likely effects of the proposed Development and their significance. It complements the assessment of ecological effects in **Chapter 8: Ecology**. The ornithology impact assessment was undertaken by Natural Research (Projects) Ltd.
9. Particular attention has been paid to species of high or moderate Nature Conservation Importance (target species). These include, but are not restricted to, species with national or international protection under the Wildlife and Countryside Act 1981 (and later amendments) and the EU Birds Directive (79/409/EEC).
10. Birds may be affected by the following phases of the proposed Development:

- construction: construction of tracks, turbines and hard-standings (including borrow pit operations);
 - operation: turbine operation and associated maintenance activities; and
 - decommissioning: the removal of installed structures and reinstatement of habitats where appropriate.
11. The potential effects of the proposed Development on birds are:
- habitat modification due to changes in land management or hydrology;
 - direct habitat loss due to land take by wind turbine bases, access tracks and ancillary structures;
 - indirect habitat loss due to the displacement of birds as a result of construction and maintenance activities, or due to the presence of the operating wind turbines close to nesting or feeding sites or habitual flight routes;
 - disturbance of bird behaviours due to construction and operational effects that do not result in displacement. This may result in reduced productivity and/or survival; and
 - collision: the killing or injury of birds following collision with rotating turbine blades and associated structures.
12. The assessment is based on information available at the time of writing, presented in **Technical Appendix 9.1: Ornithological Technical Report** This Chapter is also supported by **Technical Appendix 9.2: Collision Risk Modelling Report** and a **Confidential Figure**.
13. Prior to assessment the results of previous surveys which covered a similar area in 2012 & 2013 were provided to SNH (**Table 9.1**). Along with preliminary findings in 2019 these results were used by SNH to inform their decision to agree to a single year of baseline surveys as they add historical context of a lack of bird interest in the study area.
14. A detailed description of the proposed Development is presented in **Chapter 3: Description of the Proposed Development**, while the layout of the proposed Development is illustrated on **Figure 3.1**.

9.3 Approach to assessment and methods

9.3.1 Legislation, policy and guidance

Legislation

15. The following legislation has been taken into consideration while undertaking this assessment:
- the Environmental Impact Assessment Directive 2014/52/EU;
 - the Wildlife and Countryside Act (as amended) (WCA);
 - the Conservation (Natural Habitats, &c) Regulations 1994 (as amended) ('The Habitats Regulations');
 - the Nature Conservation (Scotland) Act 2004 (as amended);
 - the Council Directive on the Conservation of Wild Birds 2009/147/EC ('The EU 'Birds Directive'); and
 - the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017).

Guidelines

16. The following guidance has been consulted while undertaking this assessment:
- SNH Guidance: Recommended bird survey methods to inform impact assessment of onshore wind farms (2017);
 - SNH Guidance: Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas (2018a);
 - SNH Guidance: Assessing the cumulative impact of onshore wind energy developments (2018b)
 - SNH Guidance: Assessing Connectivity with Special Protection Areas (SPAs) (2016); and
 - SNH Guidance: use of avoidance rates in the SNH wind farm collision risk model (2010, update 2018).

9.3.2 Study area

17. The field surveys adhered to current Scottish Natural Heritage (SNH) Guidance (SNH, 2017), and therefore, the following survey buffers were applied around the initial proposed turbine locations for the field surveys:

- a 500 m buffer was applied for the flight activity survey, the breeding bird survey of open ground and the winter bird survey;
- a 1 km buffer was used for barn owl and goshawk;
- a 1.5 km buffer was used for black grouse; and
- a 2 km buffer was used for other scarce breeding raptors and owls.

18. These buffers are indicated on **Figure 9.1 of Technical Appendix 9.1: Ornithological Technical Report**.

9.3.3 Baseline determination

Data sources

19. In addition to the guidance listed above, the following data sources have been consulted to inform the assessment:

- SNH Sitelink web pages (online information about designated sites);
- the UK Biodiversity Action Plan (BAP);
- the Birds of Conservation Concern (BoCC) (Eaton *et al.*, 2015);
- the International Union for the Conservation of Nature (IUCN) Red list of threatened species (IUCN, 2019);
- Scottish Biodiversity List (Scottish Biodiversity Forum, 2013);
- relevant ESSs, associated documents and bird monitoring reports for developments included in the Cumulative Assessment (acquired from various sources);
- data on relevant scarce raptor species supplied by the local RSG; and
- previous surveys undertaken by NRP of the majority of the survey area in 2012 and 2013.

Field Survey

20. Baseline field surveys reported here were carried out between March 2019 and July 2020. A detailed methodology for all surveys is provided in **Technical Appendix 9.1: Ornithological Technical Report** and is briefly summarised here.

21. Breeding bird surveys of open ground were carried out between April - July 2019 following the standard SNH method for upland birds incorporating four visits.

22. Bird distribution and abundance was determined in the breeding seasons of 2019 by carrying out walkover surveys of open ground within a 500 m buffer of the proposed turbine locations, to establish the breeding bird community on open ground habitats. Four visits were completed between April and July (with a gap of at least two weeks between each visit). The ground was covered to 100 m of all points and positions of birds were mapped and behaviour noted. A summary map was compiled after all visits showing the location of each identified territory centre.

23. Detailed Scarce Breeding Bird Surveys for nesting raptors within the appropriate survey buffers were undertaken during spring/summer 2019. All suitable habitats within 2 km were searched for signs of breeding peregrine, merlin, red kite, short-eared owl and hen harrier and within 1 km for goshawk and barn owl following methodology found in Hardey *et al.* (2013).

24. Black grouse surveys were undertaken within one hour of dawn during April and May 2019, to locate the number and distribution of leks (display areas) within the black grouse survey area.

25. Generic vantage point (GVP) watches were undertaken at nine locations from April 2019 until end of March 2020 to record the flight activity of all target species. A minimum of 36 hours from each GVP was completed in the breeding season and the non-breeding season and totalled approximately 658 hours. GVP locations were selected to cover the flight activity survey area (500 m buffer) and to minimise possible interference with bird movements and behaviour. The vantage point locations and viewsheds are shown on **Technical Appendix 9.1: Ornithological Technical Report, Figure 9.2**.

26. Flight activity data for key species such as goshawk, red kite and peregrine was collected; this comprised flight duration and the bird's flying elevation above the ground at 15 second intervals. In addition, details of any migrating swans, geese and wader species were recorded if observed: flights were mapped and elevation noted but not timed. Finally, for other species a count of individuals present each 5 minute period was made. This allowed estimates to be made of the following:

- the time each key species spent flying over the study area;
- the relative use each species made of different parts of the study area; and
- the proportion of flying time each species spent at different elevations above the ground.

9.3.4 Consultation

27. Requests for scoping opinions and other consultation were made with SNH and the Royal Society for the Protection of Birds (RSPB). Ornithological information for the area was requested from Dumfries and Galloway Raptor Study Group (D&GRSG) (Table 9.1).

Table 9.1: Consultations

Consultee	Response	Action
SNH – Advice. Email from A. Hood on 29/02/2020 following submission of progress report and reports from previous year’s surveys	<p>“We can agree that one year of survey up to March 2020 will suffice to inform the Environment Statement, as long as:</p> <ul style="list-style-type: none"> All surveys have been conducted according to our guidance The remainder of the 1 year to March 2020 doesn’t differ too much to what has already been presented. That surveys are continued to fully account of March 2020 The final development layout is sufficiently covered by the surveys” 	<p>Remaining surveys conducted according to SNH guidance.</p> <p>Surveys continued to fully account of March 2020</p>
RSPB 06/03/2020 following submission of progress report and reports from previous year’s surveys	<p>“Having seen the data, we reserve judgement as to whether one season’s survey work is enough until we receive and have time to study the full environmental impact assessment, including the cumulative assessment and collision risk modelling. We do note, however, that the development is proposed to take place almost exclusively within the current footprint of commercial forestry. We also note that historically the ornithological interest was relatively low, with the exception of black grouse.</p> <p>“We are unclear as to who has been approached for information to inform the desk study. One key group to approach is the Dumfries and Galloway Raptor Study Group, particularly as the development has the potential to affect several sensitive species within the forestry.”</p> <p>“If surveys have been carried out using the appropriate methodologies, and that the number of hours of vantage point surveys has met the standard SNH guidelines, then we are happy that everything necessary will be considered as part of the EIA”</p>	D&GRSG contacted re. goshawk.
SNH- Advice email from Anee Hood on 25/03/2020 following request for advice regarding displaying goshawk.	<p>“it would be appropriate to locate the (goshawk) nest, but depending on where it might be in relation to the proposed turbines, further VP survey work may be needed to take account of the change in potential collision risk”</p>	Additional effort undertaken to locate goshawk nest
D&GRSG - telephone call with Angus Hogg, national goshawk survey coordinator on 14/04/2020.	Angus Hogg was asked if he was aware that goshawk were potentially nesting within the study area and whether it was likely that the RSG would attempt to monitor this pair. He said he wasn’t aware of them nesting in this area and that it was very unlikely that anyone would monitor them.	Additional effort undertaken to locate goshawk nest
D&GRSG -request for information on breeding peregrine on 09/07/2020	Information given by Chris Rollie of the RSPB on a pair of peregrine within the study area in 2019 though breeding not proven.	Included in assessment.

9.3.5 Effects assessed in full

29. Potential effects are assessed in respect of species of high or moderate Nature Conservation Importance, as follows:
- breeding goshawk (high Nature Conservation Importance)
 - breeding peregrine (high Nature Conservation Importance); and
 - breeding golden plover (high Nature Conservation Importance) (for Access Track A only)

9.3.6 Effects scoped out

30. No effects were scoped out prior to commencement of the desk-based study and field surveys. On the basis of the desk study and field survey work undertaken (see Baseline section below and **Technical Appendix 9.1**), the professional judgement of the ornithology team, experience from other relevant projects and taking account of policy guidance and standards, the following topic areas have been scoped out of the assessment:
- effects on internationally and nationally designated sites: the distance to the nearest SPAs and SSSIs are such that the species cited in the designations for these areas would not be affected by the proposed Development. The baseline data agree showing minimal use of the proposed Development by the SPA and SSSI qualifying species – hen harrier, golden plover, merlin, peregrine and short-eared owl. There is therefore no requirement to undertake a Habitats Regulations Appraisal, as there is no possibility of an effect on the designated site;
 - effects on the following bird populations: whooper swan, greylag goose and pink-footed goose; hen harrier, red kite, merlin; short-eared owl; black grouse; curlew and snipe. Baseline field studies in 2019 and 2020 (as well as previous studies in 2012 & 2013) recorded very infrequent use of the area near the proposed Development Site by these species of high and moderate Nature Conservation Importance. Although these species were present, their reliance on habitats and airspace in the vicinity of the proposed Development is so low that there is no potential for an adverse effect on regional or national populations as a result of construction, operational or decommissioning activities (see Baseline Conditions), and
 - effects on all bird species classified as of low Nature Conservation Importance.

9.3.7 Approach to assessment of effects

31. The assessment followed the process set out in The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations') and government guidance on the implementation of the EU Birds and Habitats Directives. The process of evaluating the effects of the proposed Development on birds ensures that the consenting authority (the Scottish Government in this case) has sufficient information to determine whether the proposed Development (either alone or in combination with other plans or projects) is likely to have a significant effect on bird interests.
32. Effects are evaluated against the existing baseline conditions, i.e. without the proposed Development present. If any mitigation is required this is then identified, and the effects reassessed with this included.
33. Where there is a potential effect on a bird population that forms part of the qualifying interest of an internationally or nationally designated site (or where such designation is proposed), i.e. Special Protection Areas (SPAs); Ramsar sites; Sites of Special Scientific Interest (SSSIs); and a site that would meet the criteria for international or national designation, then effects are judged, so far as possible, against whether the proposed Development could significantly and adversely affect the designated site's 'population' and the objectives of the site's classification.
34. Where bird populations are not protected by such a designation as listed above then professional judgement is made against a more general expectation that the proposed Development would not have a significant adverse effect on the species' overall population, range or distribution; and that it would not interfere significantly with the flight paths of migratory birds.
35. In assessing the effects consideration is given to the national and regional populations of species. Regional populations are those occurring within the host Natural Heritage Zone (NHZ) as defined by SNH (SNH, 2001) in this case NHZ 19: Western Southern Uplands & Inner Solway.

Impacts assessed

36. The following potential impacts resulting from the proposed Development on birds have been assessed in full:
- habitat modification due to changes in land management and hydrology during construction and operation;
 - direct habitat loss, both temporary during the construction phase and permanent during the operation phase, due to tree felling, land-take by turbine bases, access tracks and ancillary structures;
 - indirect habitat loss due to displacement of birds as a result of construction and maintenance activities or due to the presence of the operational wind turbines close to nesting or feeding sites or habitual flight routes;
 - collision with rotating wind turbine blades during the operational phase (i.e. killing or injuring birds); and
 - cumulative impacts within the regional population arising from the above potential impacts during the operational phase, taken along with those effects predicted for other windfarm developments.

9.3.8 Significance of effect

37. The assessment determines the potential impacts of the proposed Development and considers the likelihood of their occurrence. Effect is defined as change in the assemblage of bird species present as a result of the impacts accrued by the proposed Development. Change can occur either during or beyond the life of the proposed Development. Where the response of a population has varying degrees of likelihood, the probability of these differing outcomes is considered. Note effects can be adverse, neutral or beneficial.
38. In assessing whether an effect is significant or not, three factors are considered:
- the Nature Conservation Importance of the species involved;
 - the magnitude of the likely impact; and
 - the conservation status of the species.
39. The significance of potential effects is then determined by integrating the assessments of these factors in a reasoned way. The magnitude of likely impacts involves consideration of their spatial and temporal magnitudes. In making judgements on significance by this integration, consideration is given to the national and regional trends of the potentially affected species, and how the integrated impacts may impinge on the conservation status of the species involved at these geographical levels. Further details of the process underlying the assessment and the determination of significance follow.

Nature Conservation Importance

40. The Nature Conservation Importance of each species potentially affected by the proposed Development has been defined according to **Table 9.2**.

Table 9.2: Nature Conservation Importance

Importance	Definition
High	Species listed in Annex 1 of the EU Birds Directive. Breeding species listed on Schedule 1 of the WCA.
Moderate	Species on the BoCC 'Red list' (Eaton <i>et al.</i> , 2015) or IUCN 'Red list – 'Near Threatened' (IUCN 2017). Regularly occurring migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the proposed Development. Species present in regionally important numbers (>1 % regional population).
Low	All other species not mentioned above.

42. Species listed in Local BAPs (LBAPs) would be considered of moderate importance only if the proposed Development supported at least 1 % of the regional population.
43. All other species are considered of low Nature Conservation Importance and are not considered further in this assessment.

Magnitude of impact

44. Magnitude was determined by consideration of the spatial and temporal nature of each impact. There are five levels of spatial magnitude (**Table 9.3**) and four levels of temporal magnitude (**Table 9.4**). As this is a non-designated site, spatial magnitude was assessed in respect of regional populations within the appropriate ecological unit, in this case the Western Southern Uplands and Inner Solway Natural Heritage Zone (NHZ 19) as defined by SNH (SNH, 2001).

Table 9.3: Levels of spatial magnitude of impact

Magnitude	Definition
Very High	Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: > 80 % of regional population affected
High	Major reduction in the status or productivity of a bird population due to mortality, displacement or disturbance Guide: 21-80 % of regional population affected
Moderate	Partial reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 6-20 % of regional population affected.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 1-5 % of the regional population affected.
Negligible	Very slight reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Reduction barely discernible, approximating to the 'no change' situation. Guide: < 1 % of regional population affected.

Table 9.4: Levels of temporal magnitude of impact

Magnitude	Definition
Permanent	Impacts continuing indefinitely beyond the span of one human generation (taken as approximately 25 years), except where there is likely to be substantial improvement after this period (e.g. the replacement of mature trees by young trees which need > 25 years to reach maturity, or restoration of ground after removal of a development). Such exceptions can be termed very long effects.
Long-term	Approximately 15-25 years or longer (refer to above).
Medium-term	Approximately 5-15 years.
Short-term	Up to approximately 5 years.

47. The magnitude of an impact can be influenced by when it occurs. For example, operations undertaken in daylight hours may have little temporal overlap with the occupancy of birds' night-time roosts; and seasonality in a bird population's occupancy of a site may mean that impacts are unlikely during certain periods of the year.
48. A population's behavioural sensitivity may also be considered when assessing the magnitude of effects. Behavioural sensitivity may be judged as being high, moderate or low according to the species' ecological function and behaviour. Behavioural sensitivity can differ even between similar species and, for particular species, some populations and individuals may be more sensitive than others, and sensitivity may change over time, e.g. species are often more sensitive during the breeding season.
49. Importantly, in determining behavioural sensitivity and its contribution to an impact, where such information exists from monitoring sites, data on the responses of individual birds and bird populations to windfarms and similar developments are taken into account, along with knowledge of how rapidly the population or performance of a species is likely to recover following loss or disturbance (e.g. birds being recruited from other populations elsewhere).

Conservation status

50. Where the available data allowed, the conservation status of each potentially affected population was considered within the NHZ. For these purposes, conservation status was taken to mean the sum of the influences acting on a population which may affect its long-term distribution and abundance. Conservation status is considered to be favourable where:

- a species appears to be maintaining itself on a long-term basis as a viable component of its habitats;

- the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and
- there is (and will probably continue to be) sufficient habitat to maintain the species' population on a long-term basis.

Determining significance of potential effects

51. Following the classification of each species' Nature Conservation Importance and consideration of the magnitude of each effect, professional judgement is used to make a reasoned assessment of the likely effect on the conservation status of each potentially affected species.
52. In accordance with the EIA Regulations, each likely effect is evaluated and classified as either significant or not significant. The significance levels of effect on bird populations are described in **Table 9.5**. Effects resulting in detectable changes in the conservation status of regional populations of Nature Conservation Importance are automatically considered to be significant effects for the purposes of the EIA Regulations (i.e. no distinction is made between effects of "major" or "moderate" significance). Non-significant effects include all those which are likely to result in small to barely detectable (minor) or non-detectable (negligible) changes in conservation status of regional (and therefore national) populations.

Table 9.5 Significance levels of effects on birds

Significance level of effect	Description
Major	Detectable changes in regional populations of Nature Conservation Importance that would have a severe impact on conservation status.
Moderate	Detectable changes in regional populations of Nature Conservation Importance that would likely have an impact on their conservation status.
Minor	Small or barely discernible changes that would be unlikely to have an impact on the conservation status of regional populations of Nature Conservation Importance.
Negligible	No or non-detectable changes in the conservation status of regional populations of Nature Conservation Importance.

9.3.9 Requirements for mitigation

55. Following the identification of the potential effects, this Chapter will then identify mitigation measures if any of the potential effects on features of Nature Conservation Importance are determined to be significant. These measures will aim to avoid, reduce, or remedy the effects where possible.

9.3.10 Assessment of residual effects

56. The residual effects of the proposed Development are those effects remaining after mitigation. The residual effects have been assessed following the methodology for the assessment of potential effects but taking into consideration any proposed mitigation and enhancement.

9.3.11 Assessment of cumulative effects

57. The assessment of cumulative effects is undertaken in a similar manner to that of the potential 'in isolation' effects for the proposed Development but takes into consideration other operational, consented or within-planning windfarm developments. Developments within scoping are not considered.

58. SNH Guidance (SNH, 2018b) on assessing cumulative effects has been followed. In considering cumulative effects it is necessary to identify any effects that are minor, or greater, in isolation but that may be significant when added together.

9.3.12 Limitations to the assessment

59. The combined visible area of the nine GVPs provides 63.2 % coverage of the 500 m buffer of the proposed turbine locations. The report provided to SNH in January 2020 (**Table 9.1**) included a Figure of the visible area. This relatively low overall coverage is due in part to the landscape characteristics of the study area with steep sided valleys and relatively flat tops to the hills, and partly due to the forest cover, both of which restrict options for good GVP locations. However, the majority of 'non-visible' ground is contained within the interior of low lying gullies and cleuchs; well below the locations of proposed wind turbines. Therefore, any undetected flights would be so low in relation to the proposed turbines located on the higher ridges that they would not be at risk of collision and not included in any Collision Risk Model (CRM). Consequently, the fact that a flight has gone undetected has no material consequence on the outcome of an impact assessment.

60. Furthermore, when calculating bird occupancy within a Collision Risk Model (CRM) a weighted average of unit time per hectare per hour is derived, this is then extrapolated across the entire windfarm area plus 500 m buffer. Therefore, despite some areas being 'non-visible' a measure of bird occupancy has been applied to these areas by virtue of the time recorded by birds in the 'visible' areas. In addition, some flights within 'non-visible' areas were in fact detectable if they were above 20 m and these would have been recorded and mapped by observers. Despite these fieldwork realities, few flights were observed within, emerging from or departing to 'non-visible' areas over baseline surveys. Hence, it is considered improbable that high levels of flight activity at rotor height occurred here, compared to the relatively low levels recorded over the majority of the 'visible' areas and would not preclude a robust collision risk assessment
61. The available information on bird populations at the NHZ level is limited and available information on the results of monitoring, mitigation and enhancement work at existing windfarm developments is sparse. Therefore, the best use is made of the available literature and professional judgement to inform the assessment.
62. A full survey of breeding birds along the proposed access track options has not been possible due to Covid-19 restrictions in 2020. Much of Proposed Access Route A is an existing track with part of the new section covered by the existing 500 m Moorland Bird Survey study area surveyed in 2019. Golden plover is known to have nested in this area which was fully surveyed by NRP during the baseline surveys for the extension to the Hare Hill Windfarm, and the data from these surveys has been referenced in the assessment as well as data from monitoring studies of this area. A precautionary approach has been used when assessing this species assuming the population has remained stable in this area. The area used for assessment is shown in **Technical Appendix 9.1: Ornithological Technical Report, Figure 9.2.**

9.4 Baseline

63. This section summarises the baseline bird populations and flight activity within and surrounding the proposed Development based on surveys undertaken in the period March 2019 to July 2020. Details of methods and full results are presented in **Technical Appendix 9.1: Ornithological Technical Report.**
64. The proposed Development Site comprises commercial plantation forestry at various stages of its lifecycle. The habitats within the ornithology 2 km study area of the proposed Development includes plantation forestry, rough grazing and open moorland of rough grass and heather patches. Several small watercourses run through the Site.

9.4.1 Designations

65. The Site is not covered by any statutory nature conservation designations at international or national levels for ornithological interests. The nearest SPA is the Muirkirk and North Lowther Uplands SPA which lies approximately 9 km north east of the closest proposed turbine location. This SPA is noted for breeding hen harrier, golden plover, merlin, peregrine, short-eared owl and non-breeding hen harrier.

9.4.2 Field survey

Wildfowl

66. Greylag goose and pink-footed goose are regular winter migratory species and as such are afforded protection under the Birds Directive and were recorded during field surveys.
67. One greylag goose flight involving two birds flew within the Flight Activity Assessment Area (FA) at the Risk Height Band (RHB) of the turbines, this being given by the lower and upper limits of the recorded flight height bands which encompass the heights swept by the rotating turbine blades.
68. Only three pink-footed goose flights involving a total of 153 birds (33, 40, 80) flew at least partially through the FA at the RHB of the turbines during 658 hours of observations.
69. The low recorded use of airspace by wildfowl in the vicinity of the proposed Development is clear and the resulting risk to all regional populations as a result of collision is deemed to be so low as to not require further consideration within this assessment.

Scarce raptors and owls

70. Osprey, golden eagle, goshawk, hen harrier, red kite, merlin and peregrine were recorded during baseline surveys. All these species except goshawk are listed on Annex 1 of the Birds Directive and all are listed on Schedule 1 of the WCA. Hen harrier and merlin are Red-listed Birds of Conservation Concern (BoCC).
71. In view of the apparent low use of the proposed Development and its surrounds by osprey, golden eagle, hen harrier, red kite and merlin along with no nesting occurring in the survey years, these species are not considered further within this assessment.
72. A pair of peregrines was observed in 2019 by the D&GRSG within the 2 km study area in an area where breeding has occurred historically, most recently in 2011. Breeding was not proven, however it is considered possible that breeding may take place in future years. Peregrines almost exclusively nest on open crags or tall structures away from the forest area and therefore the effect of habitat loss and displacement on peregrine is considered to be so low as to not require further consideration within this assessment. Due to the potential for future nesting within the 2 km study area the effect of Operational Collision Risk of foraging birds will be considered further in this assessment as well as the effect of disturbance during construction.
73. Due to the flight activity recorded by goshawk and the potential for future nesting attempts by this species within the study area it will be considered further in the assessment.

Black grouse

74. Black grouse were not recorded during any surveys. Due to this species not being present in the area this species is not considered further in this assessment.

Waders

75. Curlew, golden plover, common sandpiper, woodcock, snipe and jack snipe were recorded during baseline surveys. Territories for four pairs of common sandpipers and three pairs of snipe were identified within the 500 m survey buffer.
76. Three flights by a total of 78 golden plover passed over the FA, all of which had at least part of their flight duration within the RHB of the turbines. Historically golden plover have bred in the vicinity of the proposed Access Route A in the area around Quintin Knowe and Blackcraig Hill and as this species is listed on Annex 1 of the Birds Directive it will be considered further in this assessment.
77. Two flights involving single curlews were recorded within the FA; both with at least part of their flight duration within the RHB. However, as the recorded use of the airspace in the vicinity of the proposed Development by these species is low, and there are no substantial indications of overwintering, migration or breeding by either golden plover or curlew they will not be considered further within this assessment. Snipe and common sandpiper are of low Nature Conservation Importance concern and present in low numbers and will not be considered further within this assessment.

Other species

78. Selected species of interest include: buzzard, kestrel and sparrowhawk. Crossbills were present along with other more common passerines. As these species are either of low Nature Conservation Importance or present in such low numbers that effects on regional populations are considered implausible; hence none are considered further in this assessment.

9.5 Assessment of effects

9.5.1 Species considered for assessment

Goshawk

79. Goshawks are tree nesting raptors which occupy their home range all year, and hunt over both open areas and within woodland taking a large and varied range of prey species (Kenward, 1996). They may breed in the same locality for a number of years (Hardey *et al.*, 2013). Goshawk have been perceived as a species dependent on continuous mature forestry cover (Kenward, 1996) with European birds achieving relatively high densities in mosaics of farmland and woodland (Kenward, 1996; Beier & Drennan, 1997).

80. Goshawk is a species of high Nature Conservation Importance by virtue of their Schedule 1 WCA status. Their current Conservation Status is considered to be favourable in Scotland, with the population increasing. The NHZ 19 population of goshawk was assessed in 2013 to be at a minimum 31 pairs, however this estimate is suspected to be highly conservative (Wilson *et al.*, 2015). There has been no further attempt to study the population trends of this species at a local or national level.

Peregrine

81. Peregrines are medium-sized raptors that nests almost exclusively on cliffs, crags or man-made structures. Peregrines may occupy their home range all year, moving away in periods of bad weather and hunt mostly over open areas (Ratcliffe, 1993). Peregrines may use the same nest site for many years (Ratcliffe, 1993).

82. Peregrine is a species of high Nature Conservation Importance by virtue of their listing on Annex 1 of the Birds Directive and Schedule 1 of the WCA. The peregrine population numbers a minimum of 34 breeding pairs in the NHZ and this species appears to be increasing within the NHZ (Wilson *et al.*, 2015).

Golden plover

83. Golden Plover are ground-nesting waders that breed in the uplands of Britain, spending the winter months in lowland and coastal areas and are a species of high Nature Conservation Importance by virtue of their listing on Annex 1 of the Birds Directive.

84. The NHZ 19 population of golden plover was assessed in 2013 to be at a minimum 778 pairs. Recent studies have found the Scottish population to be in favourable condition with an overall increase in the population of 3 % between 1994 and 2018 (SNH, 2019)

9.5.2 Embedded measures

85. The assessment has been undertaken under the assumption that a Bird Protection Plan (BPP), devised in consultation with Dumfries and Galloway Council and SNH, would be in place prior to the onset of construction activities. The BPP will describe survey methods for the identification of sites used by protected birds and will detail protocols for the prevention, or minimisation, of disturbance to birds as a result of activities associated with the proposed Development. The BPP would be overseen by the Ecological Clerk of Works.

86. The BPP will include a description of surveys to locate the nests or other key sites (e.g. roosts) of birds listed in Schedules 1 and 1A of the Wildlife and Countryside Act, 1981, in advance of construction works progressing within the Site of the proposed Development. In the event that an active nest or roost of a Schedule 1 or Schedule 1A species is discovered within distances given by Ruddock & Whitfield (2007) (or within a 500 m radius of the nest for Schedule 1 species not listed), a disturbance risk assessment will be prepared under the BPP and any measures considered necessary to safeguard the breeding attempt or roost (e.g. exclusion zones or restrictions on timing of works), would be submitted to SNH for agreement before recommencing work. If felling is required near to or including any nest locations this would be carried out during the non-breeding period. (Petty, 1996).

87. Should the nest of any other wild bird not listed on Schedule 1 be located, construction activities within 50 m of the nest site should be halted and the Ecological Clerk of Works (EcoW) informed immediately. A disturbance risk assessment should be undertaken and any measures considered necessary to prevent disturbance to the nest site be implemented. For some species breeding in some locations, no actions may be necessary but for others, buffers may be required around the nesting attempt to prevent unnecessary disturbance until the nest is no longer active.

9.5.3 Potential construction effects

88. The effects on birds considered are

- short- term habitat modification and direct habitat loss during construction, including felling of forestry; due to the creation of tracks, borrow-pits, turbine bases and other infrastructure elements; and
- indirect habitat loss due to displacement of nesting and foraging birds by the construction activities.

Direct habitat loss

89. Land-take as a result of construction of the proposed Development would amount to up to 55.4 ha of permanent loss. There will be a loss of 217.8 ha relating to felling of plantation forestry habitat of which there is an abundance within the study area

and its environs, and the majority of which will be subsequently replanted resulting in a permanent net loss of woodland area of 67.6 ha. Following replanting there would be an increase in the amount of broadleaf woodland within the study area leading to an overall increase in broadleaf woodland area of 209.4 ha and the area of conifer woodland would decrease by 159.4 ha (**Chapter 3: Description of the proposed Development**).

Goshawk

90. A pair of goshawk were observed displaying over a wide area in February and March 2020 with additional surveys undertaken between March and July to find a nest. Despite these additional surveys no further observations or evidence of nesting were found in May, June or July. A precautionary approach is taken here using the assumption that this pair is likely to attempt to nest within the study area during the life of the proposed Development.
91. If, in the years preceding the construction of the proposed Development, this goshawk pair nest in an area of forestry that is felled as part of the buffer around the proposed turbine or an area that is clear-felled to make way for the turbines the nest location would be lost. Goshawk prefer to nest in mature conifers and although 159.4 ha of conifer woodland will be lost, this is part of a total Forestry Study Area of 2371.8 ha consisting of three different forest plans; Euchanhead, Polskeoch and Shinnelhead. These forests are in a production phase with rotational felling and replanting ensuring suitable habitat will be available as trees mature in each coupe.
92. Goshawk are known to be able to move up to 2.5 km to another nest site if disturbed (Petty & Anderson, 1996), there is therefore the strong possibility that the pair from this territory could establish another nest elsewhere in the forest or the wider area.
93. Even if they were unable to move nest location and this territory was temporarily lost to the regional population, the effect of this habitat loss would be assessed at worst case as long-term temporal and of low spatial magnitude. Similar to nests lost during harvesting in forests undergoing normal crop rotation regimes, suitable goshawk nesting habitats would return as tree coupes mature elsewhere in the forest plantation and in nearby areas. Hence, there would be no change in the conservation status of goshawk as a result of habitat loss and the long-term temporal adverse effects of direct habitat loss on them are deemed negligible and therefore not significant under the EIA Regulations.

Golden plover

94. No breeding golden plover were found within the 500 m study area, but historically birds have nested in the vicinity of proposed Access Track A which was not covered by breeding bird surveys in 2019. In 2006 surveys were carried out by NRP to inform the EIA for the Hare Hill Extension and four golden plover territories were found in the area between Black Craig and Quentin Knowe, with two additional pairs elsewhere within the extension. In 2007 and 2012 single pairs were found within the Hare Hill Extension during annual post construction monitoring however no pairs have been recorded since (between 2013 and 2020). These post construction surveys do have limitations as although territorial birds are recorded they are primarily focussed on migratory flocks of golden plover in April and May and do not cover the top of Black Craig.
95. Other surveys carried out for the proposed Development during 2019 and 2020, namely Scarce Breeding Bird and Black Grouse surveys included coverage of the area of the access track and its buffer. Although these surveys were primarily focussed on making observations of, and searching for signs of the presence of, scarce raptors and black grouse it is worth noting that no sightings of territorial golden plovers were recorded during these surveys at the appropriate time of year within the areas shown in **Technical Appendix 9.1: Ornithological Technical Report, Figure 9.1**.
96. Ratcliffe (1976) describes the hills of Galloway as having 'uniformly low to very low densities' of golden plover giving an average density of between <0.5 and 1.5 birds per km². The construction of the access track and borrow pits will lead to 0.036 km² of potential breeding habitat being lost. Golden plover prefer to nest on flat ground and much of the route of Access Track A is on ground that is unsuitable due to the steepness of the ground, this figure is therefore given as a worst case scenario.
97. If the 2006 survey results are utilised as a worst-case scenario, then potentially four territories will lose a small amount of their overall potential breeding habitat due to the construction of the track and the borrow pits. However, this will most probably form a very small area of each of the overall territories affected (based on 1.5 birds per km²) and there is sufficient habitat around the track and the borrow pits to compensate for this loss. Even if more than one pair of golden plover were displaced and permanently lost from the regional NHZ population of 778 pairs this would be of negligible spatial magnitude (where a moderate magnitude effect of 6 % of the regional population would be on 46 pairs).

98. A small amount of potential breeding habitat (0.036 km²) will be lost due to the construction of the access track and borrow pits and the effect of this would be assessed as permanent temporal and of negligible spatial magnitude with a large amount of similar habitat nearby. There would, therefore, be no change in the conservation status of golden plover as a result of habitat loss and permanent temporal adverse effects of direct habitat loss on them are deemed negligible and therefore not significant under the EIA Regulations.

Displacement

99. The construction activities of the proposed Development, including the felling of the forest areas, construction of the Site access tracks, turbine hard-standings, substation and energy storage compound and erection of the turbines is expected to last a total of approximately 22 months. The number of bird breeding seasons potentially disrupted by construction activities would depend on the month in which construction works begin and the components of the proposed Development. For the purposes of this assessment a worst-case scenario is assumed: i.e. that construction work would start during a bird breeding season and, for any given species, breeding would be potentially affected for up to two seasons. Disturbance may also occur during the construction period along proposed Access Route A by construction traffic accessing the area of the turbine array.
100. The impacts on birds most likely to occur during the construction phase are those of indirect habitat loss due to displacement of birds through disturbance by activity of people and machines in the vicinity of the proposed Development. It is likely that noise and visual disturbance associated with construction activities could temporarily displace some of the breeding and foraging birds present, dependent on their behavioural sensitivity to human activities. Birds that are disturbed at breeding sites are vulnerable to a variety of potential effects on breeding performance, including the chilling or predation of exposed eggs/chicks, damage to or loss of eggs/chicks caused by panicked adults and the premature fledging of the young. Birds disturbed when foraging during the breeding season may also feed less efficiently and thereby breed less successfully. These impacts may lead to a short-term temporal reduction in the productivity of bird populations.
101. Disturbance effects on breeding birds would be confined to areas in the locality of the wind turbines and associated infrastructure, with different species varying in their sensitivity. Larger bird species, those higher up the food chain e.g. most raptors, or those that feed in flocks in the open tend to be more susceptible to disturbance than small birds living in structurally complex or closed habitats (e.g. woodlands) (Hill *et al.*, 1997).

Goshawk

102. The areas where territorial display was noted include seventeen coupes within the study area that were scheduled for felling during the working lifetime of the forest in fourteen of the years between 2021 and 2058 (Forest felling plan **Technical Appendix 3.2: Forestry**). If (as is suggested by this behaviour) this pair were to attempt to nest within the study area in future years and the nest trees are not felled as part of the construction or the birds relocate within the forest and thus birds remain in this territory, then these birds may be susceptible to disturbance during breeding. However, any nesting attempts by goshawk would be safeguarded under the embedded measures in the BPP, in compliance with legislative requirements to avoid disturbance to the sites of specially protected birds.
103. The potential impact of construction on goshawk foraging behaviour is unknown. Goshawks nest and hunt in some cities in continental Europe, where they are able to tolerate high levels of disturbance. Within the UK, goshawks tend to occur in relatively rural/remote areas implying that they are more sensitive to disturbance and they suffer human persecution more in some parts of the UK than in continental Europe.
104. Foraging goshawks could be displaced from habitat in the vicinity of construction activities and, in theory this could lower foraging efficiency, leading to short-term adverse effects on breeding productivity or survival. However, goshawk hunting ranges are large with respect to the area occupied by the proposed Development, with ranges recorded up to 6 km (Cramp & Simmons, 1980), and there are plenty of relatively undisturbed potential foraging habitats elsewhere in the likely home range, which would compensate for the short-term loss of the area within the proposed Development during construction.
105. In summary, a worst case scenario is that the goshawks are displaced to hunt elsewhere for the short time period (approximately 22 months) during construction. With goshawk nesting attempts being safeguarded through the BPP and foraging efficiency by breeding birds unlikely to be affected by construction activities, the short-term temporal adverse impact of construction on breeding goshawk would be spatially negligible and effects on the regional breeding population are deemed to be negligible and not significant under the EIA regulations.

Peregrine

106. The distance of the nest location from the areas of construction is 1.15 km, greater than the distance of potential disturbance of 500-700 m given in Ruddock and Whitfield (2007). Should construction occur during the breeding season, any nesting attempts by peregrine would be safeguarded under the embedded measures in the BPP, in compliance with legislative requirements to avoid disturbance to the sites of specially protected birds.
107. Peregrines could be displaced from habitat in the vicinity of construction activities while foraging and, in theory this could lower foraging efficiency, leading to short-term adverse effects on breeding productivity or survival. Peregrines have large hunting ranges though most large prey is taken within 2 km of the nest site (Hardey, 2007) and the majority of this area is outside the construction area. Peregrine is known to nest on man-made structures and forage near human habitation and therefore can be very tolerant of human activity in some situations (Ruddock & Whitfield 2007). There is also an abundance of suitable foraging habitat within the wider home range which would compensate for the short-term loss of the area within the proposed Development during construction.
108. Given the distance of construction activities from the nest location and with the peregrine nesting attempts being safeguarded through the BPP and foraging efficiency by breeding birds unlikely to be affected by construction activities, the short-term temporal adverse impact of construction on breeding peregrine would be spatially negligible and not significant under the EIA Regulations.

Golden plover

109. Should construction of proposed Access Track A occur during the breeding period (late March to late July) then a disturbance buffer of at least 200 m should be applied to any nesting birds as recommended by Fielding & Haworth (2010) and any nesting attempts would be safeguarded under the embedded BPP, in compliance with legislative requirements to avoid disturbance to the sites of specially protected birds.
110. During construction of proposed Access Track A disturbance may displace golden plover to forage nearby in similar habitat but only if construction occurs during the breeding period. The short-term temporal adverse impact of construction (including construction traffic once the track is built) on breeding golden plover would be spatially negligible and effects on the regional breeding population are deemed to be negligible and not significant under the EIA Regulations.

9.5.4 Proposed mitigation

111. There is no requirement for mitigation as there are no effects predicted to be significant.

9.5.5 Residual construction effects

112. The effects of construction on birds are at worst long term temporal magnitude, low spatial magnitude for direct habitat loss and short-term temporal magnitude negligible spatial magnitude for displacement on goshawk and are therefore not significant under the EIA Regulations.

9.5.6 Potential operational effects

113. The impacts on birds most likely to occur during the operational phase are those of:
- any long term habitat modification created by construction or later land management;
 - direct habitat loss due to the existence of tracks, turbine bases and other infrastructure elements;
 - indirect habitat loss due to displacement of birds by the presence of operating turbines and maintenance personnel; and
 - mortality through collision with rotating turbine blades, guy-lines and fencing.
114. Operational displacement impacts are less concentrated in time and in intensity than construction impacts. Indirect habitat loss through displacement can be evident by a decline in the breeding productivity or (in extreme cases) the number of breeding territories in the vicinity of the turbines (although a movement of the affected breeding pairs or territories away from the proposed Development source of disturbance may result). Displacement from areas used for feeding may also be manifest as an alteration of the flight patterns of birds which fly over the area, and this in turn, may influence survival rates and/or (for breeding birds) reproductive output through a reduction in available foraging habitat. Collision with turbine blades and other structures would be shown by the loss of birds from the population though increased mortality rates.

Habitat modification and direct habitat loss

115. Permanent habitat modification is restricted to the maintenance of the open areas surrounding the wind turbines within the forest plantation. The total land take for this is approximately 55.4 ha. The permanent direct habitat loss would be due to the presence of the turbines, proposed Access Track A and associated infrastructure.

Goshawk

116. A long-term study in European forests did not find any difference in the breeding success of goshawks in logged and unlogged stands, provided the original stand structure was altered by less than 30 % (Penteriani & Faivre, 2001). In the long term the creation of age diversity within the forest as a whole means that when areas are mature and harvested, other areas of younger forest, not yet ready for felling, would be available for goshawks to move into.
117. The land take (of 55.4 ha) is of negligible effect spatially in the context of the larger home range of this species. They would be able to make use of the altering forest structure during the normal life span of the forest rotation. The permanent adverse effects of operational Habitat Modification and Direct Habitat Loss on goshawk would be spatially negligible magnitude and effects on the regional breeding population are deemed to be negligible and not significant under the EIA Regulations.

Golden plover

118. A small amount of potential breeding habitat (0.036 km²) will be lost due to the existence of the access track and borrow pits and the effect of this would be assessed as long-term temporal and of negligible spatial magnitude with a large amount of similar habitat nearby. One of the borrow pits is likely to be restored and will become suitable habitat in the long term. There would, therefore, be no change in the conservation status of golden plover as a result of habitat loss and the permanent temporal adverse effects of direct habitat loss on them are deemed negligible and therefore not significant under the EIA Regulations.

Displacement

119. The presence and operation of wind turbines could potentially displace birds from nesting and foraging areas. Existing information (e.g. de Lucas *et al.*, 2007; Douglas *et al.*, 2011; Haworth & Fielding, 2012) and reviews of effects (e.g. Madders & Whitfield, 2006; Hötter *et al.*, 2006; Gove *et al.*, 2013) suggest that most birds are affected only slightly, if at all, although these effects require further study. For example, breeding birds have not been found to be completely displaced at distances greater than 300 m from a turbine (e.g. Gill *et al.*, 1996; Percival, 1998; Hötter *et al.*, 2006) although other studies suggest partial displacement effects at greater distances (Pearce-Higgins *et al.*, 2009). However, wind turbines might displace birds from much larger areas if they act as a barrier to bird movements, or if availability of suitable habitat is restricted. In addition, displacement effects may vary over time, as birds habituate to the operation of turbines or site-faithful individuals are lost from the population.
120. The evidence suggests that impacts vary between species and sites (see discussion for raptors; Madders & Whitfield, 2006). There is potential for some disruption of feeding and nesting due to increased human activity for maintenance purposes. However, this would be relatively infrequent, involve low levels of disturbance and would be restricted to areas of the Site accessible by tracks. Therefore, the overriding source of disturbance and displacement of birds during the operational period is considered to be the turbines operating (Pearce-Higgins *et al.*, 2009).

Goshawk

121. Similar to operational Direct Habitat Loss, if displacement of goshawk due to the presence of the turbines was to occur this would most probably result in loss of a relatively small area of the overall potential nesting and foraging habitat for this species. New nesting areas elsewhere in the forest are likely to be available and would also mature through the normal forest rotation. Foraging habitats currently exist all around and within the Site, and only a small amount would be lost to the turbines and other infrastructure.
122. Goshawk were recorded nesting in the wider area in 2015 and 2016 in part of the Upper Nithsdale Forestry Land Management Plan area until this area was felled and have not been recorded nesting in the local area between 2017 and 2019 according to the D&GRSG (Angus Hogg, *pers comm.*). This pair could potentially be the same pair and therefore presumably tolerant of the disturbance which occurs in the forest due to regular forestry works. The likely outcome is that the pair which currently nests in the forestry area would continue to do so, moving nest location when areas are felled to newly matured forestry blocks or to other forested areas adjacent to the Site.

123. If this pair is displaced and cannot relocate to a new nest location the adverse effect on the regional goshawk population would be at worst long-term temporal magnitude and spatially low magnitude, therefore operational displacement would be deemed to be negligible and not significant under the EIA Regulations.

Golden plover

124. Following construction the amount of traffic using proposed Access Track A for maintenance purposes is likely to be very low with at worst permanent temporal magnitude and spatially negligible magnitude, therefore operational Displacement would be deemed to be negligible for this species and not significant under the EIA Regulations.

Collision mortality

125. Birds that are not displaced would be potentially vulnerable to collision with the turbines. The level of collision with wind turbines is presumed to be dependent on the level of flight activity over the proposed Development and the ability of birds to detect and manoeuvre around rotating turbine blades. Birds that collide with a turbine are likely to be killed or fatally injured. This may in turn affect the maintenance of bird populations.

126. An increasing body of evidence suggests that birds' capacity to avoid collision with wind turbines is very high (SNH, 2017). The indications from studies are that collisions are rare events and occur mainly at sites where there are unusual concentrations of birds and turbines, or where the behaviour of the birds concerned leads to high-risk situations (e.g. Gill *et al.*, 1996; Percival, 1998; de Lucas *et al.*, 2007). Examples include migration flyways, and where the food resource, and therefore level of bird activity, is exceptional.

127. Collision Risk is calculated for goshawk flight activity which occurred within the 500 m buffer of the proposed wind turbines (see **Technical Appendix 9.2: Collision Risk Assessment** for further detail).

Goshawk

128. The speed used in the collision risk calculations was 9.9 m/s for goshawks. Collision risks have been calculated assuming 98 % avoidance.
129. On the basis of applying an accepted avoidance rate of 98 % for goshawk, this equates to 0.016 birds colliding with a turbine every year the proposed Development is operational or one bird colliding with a wind turbine approximately every 62.5years.
130. The goshawk population numbers a minimum of 31 breeding pairs in the NHZ and this species is thought to be experiencing a phase of expansion (Wilson *et al.*, 2015). The potential loss of one goshawk every 62.5 years is of negligible spatial magnitude and the overall adverse effect at the scale of the NHZ would be negligible and the population would maintain favourable conservation status. This effect is considered not significant in terms of the EIA Regulations.

Peregrine

131. The speed used in the collision risk calculations was 13 m/s for peregrine. Collision risks have been calculated assuming 98 % avoidance.
132. On the basis of applying an accepted avoidance rate of 98 % for peregrine, this equates to this equates to 0.031 birds colliding with a wind turbine every year the proposed Development is operational or one bird colliding with a turbine approximately every 33 years.
133. The peregrine population numbers a minimum of 34 breeding pairs in the NHZ and this species appears to be increasing within the NHZ (Wilson *et al.*, 2015). The potential loss of one peregrine every 33 years is of negligible spatial magnitude and the overall adverse effect at the scale of the NHZ would be negligible and the population would maintain favourable conservation status. This effect is considered not significant in terms of the EIA Regulations.

9.5.7 Proposed mitigation

134. There is no requirement for mitigation as there are no effects predicted to be significant.

9.5.8 Residual operational effects

135. The effects of operation of the proposed Development on birds are permanent and negligible for goshawk, peregrine and golden plover and are therefore not significant under the EIA regulations.

9.5.9 Potential cumulative effects

136. The EIA Regulations require the cumulative effects of the proposed Development with other relevant projects or plans to be assessed. SNH guidance (SNH, 2018b) on assessing cumulative effects has been followed. In considering cumulative effects, it is necessary to identify any effects that are minor (or greater) in isolation (**Table 9.5**) but that may be major cumulatively.
137. “Target” species were taken to be those species of high and moderate Nature Conservation Importance (see **Table 9.2**) for which there was some indication of a potential effect as a result of the operation of the proposed Development, which may be exacerbated cumulatively. However, no significant effects of the proposed Development in the construction phase were identified, and all effects in the operational phase were assessed as negligible. As such, the predicted in-isolation effects of the proposed Development are considered to have no potential to contribute to cumulative effects and are therefore negligible across all species.
138. In conclusion, for all bird species, the cumulative effects of the proposed Development in-combination with other projects in the NHZ are likely to be negligible and deemed to be not significant under the terms of the EIA Regulations.

9.6 Proposed monitoring

139. As the likely effects of the proposed Development on all bird species are predicted to be not significant under the terms of the EIA Regulations no monitoring will be required.

9.7 Summary and statement of effects

140. The likely effects of the proposed Development have been evaluated in accordance with the methods described in the methodology section of this Chapter. It is concluded, overall, that the likely effects of the proposed Development on all bird species are not significant under the terms of the EIA Regulations (**Table 9.6**)

Table 9.6 Summary of effects

	Predicted effect	Significance	Proposed mitigation	Residual effect
Construction				
All species	Land take	Negligible	None	Negligible
	Disturbance	Negligible*	None	Negligible
Operation				
All species	Disturbance	Negligible	None	Negligible
	Collision risk	Negligible	None	Negligible
Decommissioning				
All species	Disturbance	Negligible	None	Negligible
Cumulative				
All species	None	Negligible	None	Negligible
*Assessment undertaken on the basis that a BPP will be in place.				

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