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## **10. Ornithology**

### **10.1. Introduction**

10.1.1. This chapter of the EIA Report evaluates the effects of the Proposed Development on Ornithology. This chapter describes the methods used to establish the bird interest within the Site 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 9: Ecology of this EIA Report.

10.1.2. This chapter is structured as follows:

- Legislation, policy and guidance;
- Scoping responses and consultation;
- Assessment methodology and significance criteria;
- Baseline conditions;
- Assessment of potential effects;
- Assessment of cumulative effects;
- Mitigation Measures;
- Residual Effects; and
- Summary.

10.1.3. 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).

10.1.4. 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;
- Decommissioning: the removal of installed structures and reinstatement of habitats where appropriate.

10.1.5. 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.

10.1.6. The assessment is based on information available at the time of writing and is supported by:

- **Appendix 10.1:** Ornithological Technical Report;
- **Appendix 10.2:** Collision Risk Modelling Report; and
- **Appendix 10.3:** Confidential Annex.

10.1.7. A detailed description of the Proposed Development is presented in Chapter 4 (Description of the Proposed Development), while the layout of the Proposed Development is illustrated on **Figure 4.1**.

## **10.2. Legislation, Policy and Guidance**

### **Legislation**

10.2.1. The following legislation has been taken into account when undertaking this assessment:

- Environmental Impact Assessment Directive 2014/52/EU
- The Wildlife and Countryside Act 1981 (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
- Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

### **Policy**

10.2.2. Chapter 5 (Policy Context) of the EIA Report sets out the planning policy framework that is relevant to the Environmental Impact Assessment.

### **Guidelines**

10.2.3. The following Guidance has been consulted while undertaking this assessment:

- SNH Guidance: Assessing significance of impacts from onshore wind farms on birds outwith designated areas (2018);
- SNH Guidance: use of avoidance rates in the SNH wind farm collision risk model (2010, update 2017);
- SNH Guidance: Recommended bird survey methods to inform impact assessment of onshore wind farms (2014); and
- SNH Guidance: Assessing the cumulative impact of onshore wind energy developments (2012).

## **10.3. Scoping Responses and Consultation**

10.3.1. Throughout the scoping exercises, and subsequently during the ongoing EIA process, relevant organisations were contacted with regards to the Proposed Development. Requests for Scoping opinions and other consultation were made with Scottish Natural Heritage (SNH) and the Royal Society for the Protection of Birds (RSPB). Table 10.1 outlines the consultation responses received in relation to Ornithology.

**Table 10.1: Consultation**

Consultee	Consultation Response	Applicant Action
SNH Scoping Opinion	In regards to ornithology, survey work showing spread of survey hours should be followed in accordance with SNH guidance.	All survey work was undertaken in accordance with relevant SNH guidance.
	Will accept two years of survey including 2012/2013 season if 2017/2018 data shows similar trends. Distance strips in Figure 7 and the distance strips surrounding the Development site boundary must be consistent.	Results of two years of survey are presented within the Technical Appendix to the EIA Report. All survey methods comply with SNH guidance. SNH agreed that the survey buffers are consistent for the purpose of reporting and assessment <sup>1</sup> .
RSPB Scoping Opinion	Agree with target species listed for survey but advise that black grouse and migratory wildfowl (particularly whooper swan) be included.	Black grouse and whooper swan were duly considered but scoped out of any assessment as there were too few records and the numbers recorded were very low.
	Forest management should take into account the breeding raptor species in the area with pre-felling survey work recommended.	All forest management will follow appropriate guidance and best practice measures with regard to all wild birds.
	Future forest design plans should consider the opportunity to enhance forest edge habitat for black grouse through the provision of small leafed native broadleaves.	Noted.
	Spring migratory vantage point watches should be carried out to assess any likely impact to Annex 1 species Whooper swan and to properly inform the EIA for this project.	The spring migration period was adequately covered during the course of standard Vantage Point watches during 2013 and 2018; as such there was no requirement to undertake additional watches.

<sup>1</sup> Email from SNH to NRP, 12/07/18

## 10.4. Assessment Methodology and Significance Criteria

### Scope of Assessment

10.4.1. The methodology comprised the following:

- consultation and desk-based assessment;
- moorland breeding bird survey;
- winter transect survey;
- raptor (birds of prey) survey;
- black grouse survey;
- vantage point (VP) watches;
- collision risk analysis; and
- cumulative assessment.

### Study Area

10.4.2. The Study Area was defined with reference to the location of turbines within the Proposed Development and encompasses a series of buffers of up to 2 km radius; with buffer size dependent on the sensitivity of key species to potential effects associated with wind farm development (**Figure 10.1a and 10.1b**). The various survey areas, which make up the Study Area, are defined as follows:

- 'Site' or 'site area' refers to the area enclosed by a polygon around the outermost turbines of the Proposed Development;
- 'breeding bird survey area', 'winter walkover survey area', 'core survey area' or 'flight activity survey area' refers to the site area plus an additional 500 m wide strip around the site area;
- 'black grouse survey area' refers to the site area plus an additional 1.5 km wide strip; and
- 'raptor survey area' refers to the site area plus an additional 2 km wide strip depending on the focal species and presence of contiguous suitable habitat outside of the core survey area.

10.4.3. The current land use of the Site is predominantly commercial conifer forest. Forest restructuring, involving felling and replanting, has been extensive in recent years. A substantial area of rough grassland is present along the western boundary of the site. These habitat types are relatively abundant and widespread in this part of Dumfries and Galloway.

### Desk-based Study

10.4.4. A desk-based study was undertaken to collate existing bird records/data. Distribution and abundance data were collected from published sources<sup>2,3</sup> and nature conservation organisations (including SNH, RSPB, Dumfries and Galloway Raptor Study Group (DGRSG) and Dumfries and Galloway Environmental Resources Centre (DGERC)) in relation to species with a moderate or high nature conservation value (SNH, 2014).

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<sup>2</sup> Gibbons, D.W., Reid, J.B. & Chapman, R.A. (1993). The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991

<sup>3</sup> Forrester, R.W., Andrews, I.J., McInerney, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy, D.S. (eds) (2007). The Birds of Scotland

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## Survey Methodology

- 10.4.5. Baseline field surveys for the Proposed Development were carried out between October 2012 and August 2013, and April 2017 and March 2018. A detailed methodology for all surveys is provided in **Appendix 10.1** of this EIA Report and is briefly summarised below.

### Moorland Breeding Bird Survey

- 10.4.6. Moorland breeding bird surveys were carried out between April - June 2013 and April - July 2017, following the standard SNH method for upland birds devised by Brown & Shepherd (1993)<sup>4</sup> and incorporating four rather than the recommended minimum of two visits. Bird locations and behaviour were mapped to 1:25,000 scale, using the standard Common Birds Census notation. Supplementary behavioural observations and notes were made to determine breeding locations as accurately as possible.
- 10.4.7. Suitable habitat within the breeding bird survey area was systematically searched for evidence of breeding birds. A survey route was chosen to ensure that all parts of the breeding bird survey area were surveyed to within 100 m of the observer. The surveys were carried out during daylight hours, avoiding strong winds, heavy rain, fog and low cloud. Walking, listening and scanning by eye and with binoculars were the methods used to locate the birds. Particular attention was given to any topographical and vegetation features likely to influence bird distribution. Birds were considered to be breeding if they were observed singing, displaying, carrying nest material, if nests or young were found, evidence observed of repetitively alarmed adults or disturbance displaying, birds carrying food or in territorial dispute.

### Winter Transect Survey

- 10.4.8. Winter walkover surveys were utilised to assess the use of the Site by passage and wintering birds, supplementing observations from the flight activity survey. Wintering bird walkover surveys of the core survey area were completed between October 2012 and March 2013.

### Raptor and Owl Survey

- 10.4.9. Detailed surveys for nesting raptors within the raptor survey area were undertaken during the spring/summer 2013 and the spring/summer 2017. All crags and rock outcrops were systematically searched for evidence of breeding peregrine and merlin. All isolated trees, areas of rank vegetation and woodland edges were also closely observed for signs of breeding merlin, goshawk, osprey and red kite. Extensive areas of open ground were systematically searched for evidence of breeding by ground nesting species such as hen harriers and short-eared owl.
- 10.4.10. Systematic searches for potential nest and roost sites of barn owl were undertaken in summer 2013 and 2017. Emphasis was placed on searching for

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<sup>4</sup> Brown, A.F. & Shepherd, K.B. (1993). A method for censusing upland breeding waders. *Bird Study* 40(1): 89-195.

birds, nests, pellets, feathers and faecal splash in potentially suitable buildings within 1 km of the Proposed Development.

#### Black Grouse Survey

- 10.4.11. Black grouse surveys were undertaken within one hour of dawn during April and May 2013 and 2017, to locate the number and distribution of leks (display areas) within the black grouse survey area. All suitable areas were visited on at least two occasions.

#### Flight Activity Survey

- 10.4.12. Vantage point watches were undertaken at four locations from October 2012 until end of August 2013 and from April 2017 until end of March 2018 to record the flight behaviour of all key species. The vantage point locations and viewsheds are shown on **Figure 10.2a and 10.2b**. These watches in 2012 and 2013 totalled approximately 75 hours from each vantage point. These watches in 2017 and 2018 totalled approximately 72 hours from each vantage point. Information was collected during timed watches from these observation points covering the area up to approximately 2 km from any proposed turbine locations. Observations were gathered from locations selected to minimise possible interference with bird movements and behaviour.
- 10.4.13. Work was undertaken by a single observer per vantage point in conditions of good ground visibility. Normally, each observation period lasted three hours but, if necessary, they were suspended and later resumed to take account of changes in weather. The area in view was scanned constantly until a target species was detected perched or in flight. Once detected, the bird was followed until it ceased flying or was lost from view. The time the bird was first detected and the duration of the flying period were recorded. The route followed by the bird was plotted in the field onto 1:25,000 scale maps. The bird's flying height was estimated at the point of detection and recorded in 15 second intervals thereafter.
- 10.4.14. The main aim of the observational work was to collect data for key species that use the flight activity survey area, such as hen harrier, osprey, goshawk and red kite. In addition, details of any migrating swans and geese were recorded if observed. This allowed estimates to be made of the following:
- the time each 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.

#### **Assessment Methodology**

- 10.4.15. The assessment determines the potential effects 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.

10.4.16. 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 effect; and
- the conservation status of the species.

10.4.17. The significance of potential effects is then determined by integrating the assessments of these factors in a reasoned way. The magnitude of likely effects 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 effects 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

10.4.18. The Nature Conservation Importance of each species potentially affected by the Proposed Development was defined according to Table 10.2.

**Table 10.2: 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 et al., 2015) <sup>5</sup> or IUCN Red List of Threatened Species (IUCN, 2017) <sup>6</sup> .
	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).

10.4.19. Species listed in Local Biodiversity Action Plans (LBAPs) would be considered moderately important only if the Proposed Development supported as least 1% of the regional population.

10.4.20. All other species are considered of low Nature Conservation Importance and are not considered further in this assessment.

#### Magnitude of Effect

10.4.21. In determining the magnitude of effect, the behavioural sensitivity and ability to recover from temporary adverse conditions is considered in respect of each

<sup>5</sup> Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom,, Channel Islands and Isle of Man. British Birds 108, 708-746

<sup>6</sup> IUCN. (2017). IUCN Red List of Threatened Species (ver. 2017.3). Available at: <http://www.iucnredlist.org>. (Accessed: May 2018).

potentially affected population. Behavioural sensitivity is determined according to each species' ecological function and behaviour, using the broad criteria set out in Table 10.3. The judgement takes account of information available on the responses of birds to various stimuli (e.g. predators, noise and disturbance by humans). It should be noted that behavioural sensitivity can differ even between similar species (Schueck et al., 2001<sup>7</sup>) and that, within a particular species, some populations and individuals may be more sensitive than others, and sensitivity may change over time. Thus the behavioural responses of birds are likely to vary with both the nature and context of the stimulus and the experience and 'personality' of the bird. Behavioural sensitivity also depends on the activity of the bird. For example, a species is likely to be less tolerant of disturbance whilst breeding than at other times, and tolerance is likely to increase as breeding progresses (Holthuijzen, 1989<sup>8</sup>).

**Table 10.3: Determining Factors for Behavioural Sensitivity**

Sensitivity	Definition
High	Species or populations occupying habitats remote from human activities, or that exhibit strong and long-lasting reactions to disturbance events.
Moderate	Species or populations that appear to be warily tolerant of human activities, or exhibit short-term reactions to disturbance events.
Low	Species or populations occupying areas subject to frequent human activity and exhibiting mild and brief reaction (including flushing behaviour) to disturbance events.

10.4.22. Magnitude was determined by consideration of the spatial and temporal nature of each potential effect. There are five levels of spatial magnitude (Table 10.3) and four levels of temporal magnitude (Table 10.4). In the case of non-designated sites, spatial magnitude was assessed in respect of populations within the appropriate ecological unit; in this case the appropriate unit is taken to be the Western Southern Uplands and Inner Solway Natural Heritage Zone (NHZ 19), as defined by SNH (SNH, 2000)<sup>9</sup>.

**Table 10.4: Levels of Spatial Magnitude**

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.

<sup>7</sup> Schueck, L.S., J.M. Marzluff, J.M. and K. Steenhof, 2001. Influence of military activities on raptor abundance and behaviour. Condor 103:606-615

<sup>8</sup> Holthuijzen, A., 1989. Behaviour and productivity of nesting Prairie Falcon in relation to construction activities at Swan Falls Dam. Boise, Idaho.

<sup>9</sup> SNH. (2000). Natural Heritage Zones. SNH, Battleby, UK.

Magnitude	Definition
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 10.5: Levels of Temporal Magnitude**

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.

- 10.4.23. The magnitude of an effect 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.
- 10.4.24. Importantly, in determining sensitivity and its contribution to an effect, where such information exists from monitoring sites, data on the responses of individual birds and bird populations to wind farms 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

- 10.4.25. 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

- 10.4.26. 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.
- 10.4.27. 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 10.6. 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 barely detectable (minor) or non-detectable (negligible) changes in conservation status of regional (and therefore national) populations. If a potential effect is determined to be significant, measures to avoid, reduce or remedy the effect are suggested wherever possible.

**Table 10.6: 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.

**Assessment Limitations**

- 10.4.28. No significant information gaps were identified.

**10.5. Baseline Conditions**

**Designated sites**

- 10.5.1. The Site is not located within or adjacent to any statutory sites designated for ornithological interest and there are no such sites within 10 km of the Site.
- 10.5.2. The only statutory designated site for ornithological interest within 20 km of the Site is the Loch Ken and River Dee Marshes Special Protection Area (SPA) which is situated c.13 km to the south and supports wintering populations of Greenland white-fronted goose and greylag goose.

- 10.5.3. Following current SNH guidance (SNH, 2012) on the connectivity of SPA populations with supporting habitats in the wider environment, the distances to all SPAs in the surrounding area are greater than the reported range/connectivity distance for the qualifying species listed for the individual SPAs or despite being within 20 km of a goose SPA have no connectivity with the qualifying interests of the SPA (Mitchell, 2012<sup>10</sup>).
- 10.5.4. As such, there are considered to be no SPAs that warrant further consideration within the EIA, therefore they are scoped out of the assessment.

### **Field Survey**

#### **Wildfowl**

- 10.5.5. Wildfowl records were limited to greylag goose, pink-footed goose, barnacle goose and whooper swan during winter 2012/13 and 2017/18. There are no wintering areas in the vicinity and relatively little migratory traffic was recorded relative to the known volume of movements by these species. There were few records and the numbers recorded were very low (**Figure 10.3**).
- 10.5.6. Two flights by whooper swan, involving a total of 12 birds, were recorded within 500 m of the Proposed Development. A total duration of 536 seconds of flight activity was recorded; of which 473 seconds was spent at collision risk height, *i.e.* between 30 - 150 m in height. According to Table 10.2, whooper swan is a species of high Nature Conservation Importance. However, the Proposed Development does not contain suitable habitat for this species and clearly does not lie on a route that is important for locally commuting birds or passage individuals. On the basis of this information, therefore, whooper swan is not considered further in this Chapter of the EIA Report.
- 10.5.7. Similarly, according to Table 10.2, barnacle goose is a species of high Nature Conservation Importance. However, only a single skein of barnacle geese was recorded during the entire survey period. Due to the very low level of activity recorded for barnacle goose, there is no basis for a prospective significant effect under the EIA Regulations, and there is no requirement for a more detailed assessment and are not considered further in this Chapter of the EIA Report.
- 10.5.8. Greylag goose and pink-footed goose are considered to be of low Nature Conservation Importance in relation to the Proposed Development due to the fact that there are no wintering areas in the vicinity and very little migratory traffic was recorded relative to the known volume of movements by this species. Therefore there is no requirement for a more detailed assessment and they are not considered further in this Chapter of the EIA Report.

#### **Scarce raptors and owls**

- 10.5.9. Peregrine, goshawk, red kite, hen harrier, osprey, merlin, hobby and barn owl were recorded during baseline surveys. However, only goshawk, red kite, hen harrier, osprey and merlin were observed within the 500 m flight activity survey area of the Proposed Development (**Figure 10.4**).

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<sup>10</sup> Mitchell, C. 2012. *Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland*. Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge. 108pp

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- 10.5.10. Goshawk was recorded twice in 2013 and throughout the year in 2017/18 within the Study area. Goshawk was considered to have probably bred on or near to the Site in 2017; however, no nesting sites were located despite searches in potential breeding habitat in the vicinity of sightings. Ten flights by goshawk were recorded within 500 m of the Proposed Development. A total duration of 807 seconds of flight activity was recorded, of which 277 seconds was spent at collision risk height.
- 10.5.11. Red kite was recorded to varying frequencies during the course of ornithological surveys, with the majority of observations made during the 2017 breeding season. Two active nest sites were located in 2017; one located within 2 km of the Proposed Development (**Confidential Appendix 10.3**). There was no evidence of breeding in 2013 despite searches in potential breeding habitat. Eleven flights by red kite were recorded within 500 m of the Proposed Development. A total duration of 1,199 seconds of flight activity was recorded; of which 768 seconds was spent at collision risk height.
- 10.5.12. Hen harrier was observed occasionally during the survey period with the majority of observations made during the 2017 breeding season. There was no evidence of breeding in 2013 or 2017 despite searches in potential breeding habitat within 2 km of the Proposed Development. During September 2017, a winter roost site was found; however, the roost site was only occasionally used by a single male and wasn't recorded as in use after October 2017. Four flights by hen harrier were recorded within 500 m of the Proposed Development. A total duration of 271 seconds of flight activity was recorded; of which 41 seconds was spent at collision risk height.
- 10.5.13. Osprey was recorded frequently during the breeding season in 2013 and 2017, with the majority of observations made over Kendoon Loch. Evidence of a breeding attempt by osprey was recorded in 2013; however, despite searches, no nest location was found. No evidence of breeding by osprey was obtained during 2017, despite searches in potential breeding habitat within 2 km of the Proposed Development. Six flights by osprey were recorded within 500 m of the Proposed Development. A total duration of 452 seconds of flight activity was recorded; of which 435 seconds was spent at collision risk height.
- 10.5.14. One flight by merlin was recorded within 500 m of the Proposed Development during Vantage Point watches. A total duration of 29 seconds of flight activity was recorded; all of which was spent at collision risk height. No evidence of breeding by merlin was recorded, even in the wider survey area. Merlin is a species of high Nature Conservation Importance (Table 10.2). However, in light of the sparse presence of this species at distances where individuals may be affected by the Proposed Development, merlin is not considered further in this Chapter of the EIA Report.
- 10.5.15. Two flights by peregrine were recorded; however, neither was seen during Vantage Point watches. The first was of an immature bird seen on 21 January 2013. The second record was of a male, seen hunting, on 20 April 2017. No evidence of breeding by peregrine was recorded, even in the wider survey area. Peregrine is a species of high Nature Conservation Importance (Table 10.2). However, in light of the sparse presence of this species at distances where

individuals may be affected by the Proposed Development, peregrine is not considered further in this Chapter of the EIA Report.

10.5.16. Hobby was recorded once during the non-breeding season (in October 2017). Hobby is a species of high Nature Conservation Importance (Table 10.2). However, no evidence of breeding by hobby was obtained during baseline surveys and the single record was presumed to be a wandering individual; as such hobby is not considered further in this Chapter of the EIA Report.

10.5.17. Barn owl is a species of high Nature Conservation Importance (Table 10.2). However, it is also very tolerant of human activities and so potential for disturbance impact during construction, operation and decommissioning is intrinsically low. One barn owl breeding site was confirmed during 2017; however, this was at a distance greater than 2 km from the Proposed Development. No further suitable nest sites were identified (see **Confidential Figure in Appendix 10.3**) and so no nest sites (and associated foraging ranges: Bunn et al., 1982<sup>11</sup>) were within a distance at which any substantive disturbance could occur as a result of the Proposed Development, regardless of any habitat modifications connected with the Proposed Development. Moreover, barn owls generally fly below collision risk height when foraging, so potential for collision is also low. Therefore, as barn owls would not be adversely affected by the Proposed Development, this species is not considered further in this Chapter of the EIA Report.

#### **Black grouse**

10.5.18. There was no evidence of lekking black grouse within the Site or survey area (see **Figure 10.6**).

10.5.19. Black grouse is a species of moderate Nature Conservation Importance (Table 10.2). As black grouse observations were very rare (only two records within the 1.5 km buffer of the Proposed Development during 23 months of ornithological surveys) this suggests that the potential for construction/decommissioning and operational activities to disturb or displace black grouse is minimal, at worst. Therefore, as it is considered that black grouse would not be adversely affected by the Proposed Development, this species is not considered further in this Chapter of the EIA Report.

#### **Waders**

10.5.20. Two species of wader of conservation concern were recorded during baseline surveys; curlew and woodcock (**Appendix 10.1**).

10.5.21. No flights or breeding territories of waders were recorded within the 500 m buffer of the Proposed Development. In light of the sparse presence of these species at distances where individuals may be affected by the Proposed Development, curlew and woodcock are not considered further in this Chapter of the EIA Report.

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<sup>11</sup> Bunn, DS, Warburton, AB & Wilson, RDS. 1982. The Barn Owl. T & AD Poyser. Calton.

### Other species

- 10.5.22. No breeding species of conservation concern were recorded in the 500 m buffer of the Proposed Development during moorland breeding bird surveys in 2013 and 2017.
- 10.5.23. All of the open-ground passerine species are regionally widespread and common. The changes induced by the Proposed Development will be largely immaterial in terms of the regional effects on the conservation status of passerine birds. In view of their local numbers relative to wider abundance, and the low sensitivity of such passerines to the impacts of wind farms, these species are not considered further in this Chapter of the EIA Report.

## 10.6. Assessment of Potential Effects

### Effects Scoped Out

- 10.6.1. On the basis of the desk study and field survey work undertaken, the professional judgement of the ornithology team, experience from other relevant projects, consultations and taking account of policy guidance, 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 no species cited in the designations for these areas will be affected by the Proposed Development.
  - Effects on the following bird populations: whooper swan, barnacle goose, pink-footed goose, greylag goose, peregrine, merlin, hobby, barn owl, black grouse, curlew and woodcock. Baseline field studies 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, they were recorded infrequently, and in relatively small numbers (**Appendix 10.1**). Hence, their reliance on habitats (e.g. for breeding, roosting or foraging) and airspace in the vicinity of the Proposed Development was clearly very low, and the Proposed Development will have negligible effects on relevant populations of these species. Consequently, given regional abundance and/or behavioural sensitivity there is considered to be no potential for any adverse effect on regional populations as a result of construction, operational or decommissioning activities (see Baseline Conditions).
  - Effects on all bird species classified as of low Nature Conservation Importance.
- 10.6.2. Potential effects are evaluated in respect of species of high or moderate Nature Conservation Importance (Table 10.7). Emphasis is given to species identified as sensitive receptors. In considering the Nature Conservation Importance of potentially affected species, consideration has been given to the criteria in Table 10.2. The types of potential effects resulting from the Proposed Development on birds are detailed in Paragraph 10.1.5

**Table 10.7: Nature Conservation Importance of Potentially Affected Species**

Importance	Species
High	Goshawk, red kite, hen harrier, osprey
Moderate	N/A
Low	N/A

### Ornithology Best Practice Measures

- 10.6.3. The assessment has been undertaken under the assumption that a Breeding Bird Protection Plan (BBPP), approved by SNH, would be in place prior to the onset of wind farm-related construction work. The BBPP would describe survey methods for the identification of sites used by protected and sensitive birds and would detail operational protocols for the prevention or minimisation of disturbance to birds as a result of activities associated with the construction of the Proposed Development. The BBPP would be overseen by an Ecological Clerk of Works (ECOW).
- 10.6.4. The BBPP would describe surveys to locate the nests of all birds, including those listed in Schedule 1 of the WCA, which will be undertaken in advance of forestry activities and construction (and decommissioning) works during the period March-August. Should an active nest site of a Schedule 1 bird be located, all constructions works within 500 m of the nest site should be halted immediately and a disturbance risk assessment prepared. The risk assessment should consider the possible implications on the breeding attempt of each type of construction activity and set out necessary measures to ensure that no disturbance occurs. Details of measures would be submitted to SNH for agreement before recommencing work.
- 10.6.5. 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.
- 10.6.6. Should a black grouse display site be located, all construction activities within 500 m of the display site should be halted immediately and a disturbance risk assessment prepared. In the case of displaying black grouse, restrictions to the timing of certain construction activities in the vicinity of the display site should suffice to prevent unnecessary disturbance. As an example, construction activities including vehicle movements, within 500m of any identified display site should not occur within three hours of sunrise between 15 March and 10 June. Details should be agreed with SNH prior to commencement of activities.

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## Potential Construction Impacts

### Disturbance of Breeding Birds

- 10.6.7. Construction of the Proposed Development is anticipated to last for approximately 18 months. Disturbance from construction will therefore potentially affect two bird-breeding seasons (March-August). Construction activity could result in unpredictable disturbance by personnel and machinery to specific areas of the Site. The result may be a reduction in breeding success, changes in range use or temporary or permanent displacement of individual birds. However, no breeding birds of moderate or high importance were located near to borrow pits or areas where operating machinery is likely. No disturbance impacts from the working of borrow pits are predicted. While the potential for short-term temporal and low spatial magnitude impacts exists, on balance, the construction effects on breeding red kite, hen harrier and osprey are deemed to be negligible and not significant under the EIA regulations.
- 10.6.8. Only goshawk may have nested at a distance where breeding birds could potentially be disturbed by construction activities associated with the Proposed Development, although no nest site was located despite dedicated searches (see **Appendix 10.1**). Depending on the timing of such activities, this could prevent breeding or prevent successful breeding for a short-term period. The short-term effect of disturbance to goshawk through construction activities, and the proposed provision of ornithology best practice measures (see paragraph 10.6.3), would not have a measurable effect on abundance, survival or productivity at the regional scale, and the effects are deemed to be negligible and not significant under the terms of the EIA Regulations.

### Disturbance to Foraging Birds

- 10.6.9. Foraging red kite, hen harrier and osprey rarely use the Site, as the habitat is inherently unsuitable. However, foraging birds would be potentially displaced from localised areas around the operational borrow pits and construction sites such as the turbine locations, connecting tracks, site access route, lay-down areas and substation. However, these species have large foraging ranges relative to the scale of any displacement. Moreover, there is no evidence to suggest that the localised areas around the construction work sites are critical to the performance of these species (*i.e.* foraging habitat does not appear to be limiting for the species in question, and there is no reason to believe that the potential displacement area provides unusually profitable foraging opportunities). During the non-breeding period, when foraging birds are not constrained by nest site location, it is considered reasonable to assume they would accommodate any displacement by more intensively exploiting less disturbed areas.
- 10.6.10. Therefore, although red kite, hen harrier and osprey are of high Nature Conservation Importance (Table 10.2), they will be essentially behaviourally insensitive (Table 10.3) to the potential adverse effects of construction activities (that are intrinsically short term: Table 10.5), and so the magnitude of spatial effects will be negligible (Table 10.4), at worst. Consequently, the level of effect on these species during construction is assuredly negligible

(Table 10.6), and thereby the effects are judged to be not significant under the terms of the EIA Regulations.

- 10.6.11. The potential impact of construction on goshawk hunting 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 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. A worst case scenario is that the goshawks are displaced to hunt elsewhere for the short time period during construction. The magnitude of this impact is predicted to be negligible at the regional (NHZ) scale. Although goshawk are of high Nature Conservation Importance, the impacts are judged to be negligible and the effects are judged to be not significant under the terms of the EIA Regulations.

#### Direct Habitat Loss

- 10.6.12. As set out in Chapter 4: Description of the Proposed Development, the construction of turbine bases, access tracks, borrow pits and other associated infrastructure will result in a permanent direct loss of approximately 24.5 ha of habitat, mainly conifer forest. This habitat loss is very small and considered of negligible ornithological significance at the scale of the Western Southern Uplands & Inner Solway NHZ. The effect of this habitat loss is spatially negligible in relation to the home range requirements of all potentially affected species. Hence, there will be no change in the conservation status of potentially affected species as a result of habitat loss and the effects of direct habitat loss on all ornithological interests are deemed negligible and not significant under the EIA Regulations.

### **Potential Operational Impacts**

#### Displacement

- 10.6.13. Red kite, hen harrier and osprey were not recorded as breeding at distances at which operational displacement could potentially constitute an adverse effect. Furthermore, the Proposed Development is clearly not critical to the requirements of foraging red kite, hen harrier and osprey; as despite observation effort being high and spread over two years, flight activity levels and sightings were low. Even if operational displacement of foraging birds does occur, the very low baseline flight activity of red kite, hen harrier and osprey in the Site indicates that it will have minimal local adverse effects on the profitability of foraging red kite, hen harrier and osprey and indiscernible effects on regional populations. The magnitude of operational disturbance effects on these diurnal raptors, species of high Nature Conservation Importance, is considered to be negligible. These effects are not deemed to be significant under the terms of the EIA Regulations.
- 10.6.14. Goshawk is a species of high Nature Conservation Importance (Table 10.2) by virtue of their Schedule 1 WCA status. Their current Conservation Status is considered to be favourable in Scotland, with the population increasing. Goshawks have been perceived as a species dependent on continuous mature

forestry cover (Kenward, 1996<sup>12</sup>), with European birds achieving relatively high densities in mosaics of farmland and woodland (Kenward, 1996<sup>13</sup>; Beier & Drennan, 1997<sup>14</sup>). There is a relative abundance of forestry within the wider area of the Proposed Development. In the short term, potential nesting habitat at the Site will be lost. However, a long-term study of goshawks 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<sup>15</sup>). 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, will be available for goshawks to move into. Therefore, changes in the age structure of the forest directly related to the operation of the Proposed Development are predicted to have an impact of negligible significance on goshawks' nest sites at NHZ population levels and are not significant under the terms of the EIA Regulations.

#### Collision Risk

- 10.6.15. The main potential operational impacts of wind farms on birds are considered to be mortality through collision with turbine blades.
- 10.6.16. Flight activity by goshawk, red kite, hen harrier and osprey was recorded within the 500 m buffer of the Proposed Development (**Figure 10.5**). Collision risk assessments were calculated for these species (**Appendix 10.2**)

#### *Goshawk*

- 10.6.17. The speed used in the collision risk calculations was 14 m / sec for goshawks. Collision risks have been calculated assuming 98% avoidance for goshawks (SNH, 2010 update 2017). Full details of the calculations are shown in **Appendix 10.2**.
- 10.6.18. On the basis of applying an accepted avoidance rate of 98% for goshawk, this equates to one bird colliding with a turbine approximately every 47 years (approximately 0.53 birds over the 25 year life of the Proposed Development).
- 10.6.19. The goshawk population numbers approximately 29 breeding pairs in Dumfries and Galloway and this species is thought to be experiencing a phase of expansion. The potential loss of one goshawk every 47 years is of negligible magnitude, and the overall effect at the scale of the NHZ would be negligible. This effect is considered not significant in terms of the EIA Regulations, and the population would maintain favourable conservation status.

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<sup>12</sup> Kenward, R.E. 1996. Goshawk adaptation to deforestation: Does Europe differ from North America? Chapter 23. In: Bird, D., Varland, D. & Negro, J. 1996. Raptors in Human Landscapes. Academic Press. San Diego.

<sup>13</sup> Ibid

<sup>14</sup> Beier, P. & Drennan, J.E. 1997. Forest structure and prey abundance in foraging areas of northern goshawks. *Ecological Applications*, 72, 564-571.

<sup>15</sup> Penteriani, V. & Faivre, B. 2001. Effects of harvesting timber stands on goshawk nesting in two European areas. *Biological Conservation*, 101:211-216

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*Red kite*

- 10.6.20. The speed used in the collision risk calculations was 11 m / sec for red kites. Collision risks have been calculated assuming 99% avoidance for red kites (SNH, 2010 update 2017). Full details of the calculations are shown in **Appendix 10.2**.
- 10.6.21. On the basis of applying an accepted avoidance rate of 99% for red kite, this equates to one bird colliding with a turbine approximately every 36 years (approximately 0.69 over the 25 year life of the Proposed Development).
- 10.6.22. Red kites were re-introduced to Dumfries and Galloway from 2001 until 2005 and have expanded to a breeding population in excess of 108 pairs in 2016. Productivity is high. At least 120 young were produced in 2016. This population has favourable conservation status.
- 10.6.23. The potential loss of one red kite every 36 years is of negligible magnitude, and the overall effect at the scale of the NHZ would be negligible. This effect is considered not significant in terms of the EIA Regulations, and the population would maintain favourable conservation status.

*Hen harrier*

- 10.6.24. The speed used in the collision risk calculations was 13 m / sec for hen harriers. Collision risks have been calculated assuming 99% avoidance for hen harriers (SNH, 2010 update 2017). Full details of the calculations are shown in **Appendix 10.2**.
- 10.6.25. On the basis of applying an accepted avoidance rate of 99% for hen harrier, this equates to one bird colliding with a turbine approximately every 708 years (approximately 0.035 birds over the 25 year life of the Proposed Development).
- 10.6.26. The potential loss of one hen harrier every 708 years is of negligible magnitude, and the overall effect at the scale of the NHZ would be negligible. This effect is considered not significant in terms of the EIA Regulations, and the population would maintain favourable conservation status.

*Osprey*

- 10.6.27. The speed used in the collision risk calculations was 16 m / sec for osprey. Collision risks have been calculated assuming 98% avoidance for osprey (SNH, 2010 update 2017). Full details of the calculations are shown in **Appendix 10.2**.
- 10.6.28. On the basis of applying an accepted avoidance rate of 98% for osprey, this equates to one bird colliding with a turbine approximately every 74 years (approximately 0.34 birds over the 25 year life of the Proposed Development).
- 10.6.29. The potential loss of one osprey every 74 years is of negligible magnitude, and the overall effect at the scale of the NHZ would be negligible. This effect is considered not significant in terms of the EIA Regulations, and the population would maintain favourable conservation status.

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### **Potential Decommissioning Impacts**

- 10.6.30. Habitat reinstatement requirements would be set out in consultation with the statutory authorities at the time of decommissioning. Turbines will be removed at the end of the operational phase (25 years), with foundations removed to 1 m below ground level as part of site restoration. Disturbance effects due to decommissioning would last for a shorter time and be of lower intensity than during construction, and so effects would be similar in nature but of lower magnitude during decommissioning. If decommissioning is to occur during times of the year when breeding birds might be affected, best practice measures, like those used during construction, will be put into place. These measures will include searches for nesting Schedule 1 bird species.
- 10.6.31. The magnitude of decommissioning effects on all species is considered to be negligible. Even in the case of species of highest Nature Conservation Importance (Table 10.7) these effects are judged as being highly unlikely to be significant under the terms of the EIA Regulations.

### **10.7. Assessment of Cumulative Effects**

- 10.7.1. The EIA Regulations require the cumulative effects of the Proposed Development with other relevant projects or plans to be assessed. SNH guidance (SNH, 2012) 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 10.6) but that may be major cumulatively.
- 10.7.2. "Target" species were taken to be those species of high Nature Conservation Importance (Tables 10.2 and 10.7) for which there was some indication of a potential effect as a result of the Proposed Development, which may be exacerbated cumulatively. However, no significant effects of the Proposed Development were identified, and all effects on all bird species were deemed to be of negligible significance (Table 10.6). 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.
- 10.7.3. 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.

### **10.8. Mitigation Measures**

- 10.8.1. The assessment has concluded that there would be no significant effects on bird species; therefore, mitigation is not required.

### **10.9. Residual Effects**

- 10.9.1. As the assessment concluded that there was no requirement for mitigation, no significant residual effects have been identified.

## **10.10. Summary**

- 10.10.1. 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.