

Chapter 8
Ornithology

SCOTTISHPOWER RENEWABLES

Table of contents

8.1	**Introduction**	**4**
8.1.1	Overview	4
8.1.2	Site Description	4
8.1.3	Terms of Reference	4
8.2	**Legislation, Policy and Guidance**	**4**
8.2.1	Legislation	4
8.2.2	Policy	4
8.2.3	Guidance	5
8.3	**Consultation**	**5**
8.4	**Assessment Methodology and Significance Criteria**	**5**
8.4.1	Study Area	5
8.4.2	Desk Study	6
8.4.3	Field Surveys	6
8.4.4	Assessment Methodology	6
8.4.5	Limitations to Assessment	8
8.5	**Baseline Conditions**	**8**
8.5.1	Consultation and Designated Sites	8
8.5.2	Protected and Notable Species of Conservation Concern	8
8.5.3	Field Survey Results	9
8.5.4	Flight Activity Survey	9
8.5.5	Scarce Breeding Raptor Survey	9
8.5.6	Lekking Black Grouse Survey	9
8.5.7	Breeding Nightjar Survey	9
8.5.8	Moorland Breeding Bird Survey	9
8.5.9	Receptor Sensitivity	10
8.5.10	Reference Populations and Conservation Status of the Scoped in VOR: Goshawk	11
8.6	**Potential Effects**	**12**
8.6.1	Description of Potential Effects	12
8.6.2	Construction	12
8.6.3	Operation	12
8.6.4	Mitigation by Design and Embedded Mitigation	13
8.6.5	Assessment of Potential Effects on the VOR: Goshawk	13
8.7	**Mitigation**	**15**
8.7.1	Pre-Construction	15
8.7.2	Construction	16
8.7.3	Operation	16
8.8	**Residual Effects**	**16**
8.9	**Cumulative Assessment**	**16**
8.9.1	Background Information	16
8.9.2	Assessment of Cumulative Effects to Goshawk	17
8.10	**Summary**	**17**
8.11	**References**	**18**

List of Figures

Figure 8.1 Flight Activity Survey Vantage Point Locations and Viewsheds
Figure 8.2 Targeted Ornithological Survey Areas
Figure 8.3 Ornithological Designated Sites and Natural Heritage Zones (NHZs)
Figure 8.4a Flight Activity Survey Results: Raptors (Non-breeding Season)
Figure 8.4b Flight Activity Survey Results: Raptors (Breeding Season)
Figure 8.5 Flight Activity Survey Results: Waterfowl
Figure 8.6 Flight Activity Survey Results: Waders
Figure 8.7 Scarce Raptor Survey Results
Figure 8.8 Breeding Bird Territories

List of Technical Appendices

Technical Appendix 8.1 Ornithological Technical Report
Technical Appendix 8.2 Ornithological Confidential Appendix

Chapter 8

8 Ornithology

8.1 Introduction

8.1.1 Overview

1. This chapter reports the outcome of the assessment of effects from the Proposed Development to ornithological receptors. Together with **Chapter 7: Ecology and Biodiversity** this chapter completes the assessment of effects from the Proposed Development on ecology and biodiversity.

2. The assessment uses data collated from a commissioned programme of ornithological surveys undertaken during the period September 2019 to August 2020. In addition, a consultation and desk study exercise were conducted to obtain information from land management organisations and ornithological interest groups with local knowledge so that the baseline data gathered was as comprehensive as possible.

8.1.2 Site Description

3. The Proposed Development, constituting an eight-turbine extension to the operational Harestanes Windfarm, is located approximately 15km north of Dumfries within an area of coniferous woodland (the Site) managed on behalf of the Scottish Ministers by Forestry and Land Scotland (FLS). The Site is bordered by rough moorland pasture in the east, grazing pasture and the A701 road in the south, while coniferous forestry dominates the setting in the north and west.

8.1.3 Terms of Reference

4. The following terms are used within this chapter to describe particular areas of interest or features of relevance to the ornithological studies and impact assessment:

- **Initial Site Feasibility Study Area**: the area upon which the desk study, consultation exercise and flight activity surveys were based from the outset of the ornithological survey programme;
- **Developable Area**: area not constrained by the design and that upon which targeted ornithological surveys were based (see also **Chapter 3: Site Selection and Design**);
- **Site**: the area within the Site Boundary / Application Boundary for which the Proposed Development will be contained;
- **Proposed Development**: the aspects of the Harestanes South Windfarm Extension for which permission is sought to construct and operate;
- **Development Footprint**: the area of land that will be taken up by, and hence directly affected by the Proposed Development, including wind turbines bases, access roads, hardstanding and other ancillary features; and
- **Windfarm Polygon**: the area enclosed by the tips of the outermost turbine rotors; this area (plus a buffer of 500m) is used to identif flights by target species for inclusion in collision risk modelling.

8.2 Legislation, Policy and Guidance

8.2.1 Legislation

8.2.1.1 International Legislation

The Habitats Directive

5. The Habitats Directive is the short name for European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. The Habitats Directive provides the legal framework and protection for Natura Sites, including Special Protection Areas (SPAs) under the Birds Directive.

The Birds Directive

6. The Birds Directive is the short name for Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds. The Birds Directive protects all wild birds, and their nests, eggs and habitats, within the European Community and requires the classification of Special Protection Areas for species featured on its Annex I and regularly occurring migratory species. The Birds Directive is transposed into UK law through the Wildlife and Countryside Act (1981, as amended) and the Habitats Regulations as described within **Section 8.2.1.2** below.

8.2.1.2 National Legislation

The Conservation of (Natural Habitats &c.) Regulations 1994 (as amended) (The Habitats Regulations)

7. In Scotland, the Habitats Directive is translated into specific legal obligations by the Conservation (Natural Habitats &c.) Regulations 1994. This piece of legislation is usually known as the Habitats Regulations.

The Wildlife and Countryside Act 1981 (as amended)

8. The act makes it an offence of intentionally or recklessly kill, injure or take any wild bird or to take, damage or destroy the nest of any wild bird while that nest is in use or being built, and intentionally or recklessly disturb birds and their dependent young listed on Schedule 1 (Part I) at, on or near an ‘active’ nest.

8.2.2 Policy

Scottish Planning Policy 2014 (SPP 14)

9. SPP 14 sets out national planning policy considerations in relation to Scotland’s natural heritage. It summarises the main statutory obligations on the conservation of natural heritage and explains, as part of a wider framework for conservation and development, how natural heritage objectives should be reflected in development plans.

10. SPP 14 describes the role of the planning system in safeguarding sites of national and international importance, provides guidance on the approach to be adopted in relation to local and non-statutory designations and draws attention to the importance of safeguarding and enhancing natural heritage beyond the confines of designated areas.

Scottish Planning Policy on Renewable Energy

11. This planning policy defines factors to be taken into account when considering policies for renewable energy developments or applications for planning permission; includes considerations regarding international and national natural heritage designations and sites outwith these.

Scottish Biodiversity List (SBL)

12. The Scottish Biodiversity List is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland.

13. By identifying the species and habitats that are of the highest priority for biodiversity conservation, the list helps public bodies carry out their biodiversity duty.

Policy Statement No. 02/02

14. This Policy statement comprises strategic location guidance for onshore wind farms in respect of natural heritage.

Dumfries and Galloway Biodiversity Action Plan

15. This plan aims to ensure that biodiversity issues are given a high priority and identifies important habitats and species relevant to the region that need to be conserved or enhanced and suggests actions that could be undertaken.

8.2.3 Guidance

16. The following guidance has been considered as part of this assessment:

- Electricity Works (Environmental Impact Assessment (Scotland) Regulations 2017 (EIA Regulations);
- Planning Advice Note (PAN) 60 Planning for Natural Heritage 2000;
- Scottish Government Online Renewables Advice on Onshore Wind Turbines (2011, updated 2014);
- Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Windfarms. Scottish Natural Heritage (SNH, 2017); and
- Assessing the Cumulative Impacts of Onshore Wind Farms on Birds (SNH. 2018a).

8.3 Consultation

17. To ensure a comprehensive understanding of the potential ornithological issues associated with the Site to inform survey methodology and assessment, various stakeholders were contacted for information and comment. **Table 8.1** details the consultees, their responses and any subsequent actions if relevant.

Consultee	Date	Response	Action
Royal Society for the Protection of Birds	11/05/2020	The RSPB generally, agreed with the proposed scope of the ornithology survey work and assessment, but advised that surveys for migratory waterfowl, including pink-footed geese was included. Additionally, with specific regard to pink-footed geese, the RSPB concluded that there was potential connectivity with qualifying populations for two SPAs in the region. The RSPB commented that they did not agree with one year of bird survey work. They felt that it cannot be assumed that data from consented wind farms would adequately inform the proposal and data from these sites was also likely to be over five years old. The RSPB also advised that this judgement is not possible until a complete year of survey work was completed for ornithological species including breeding, wintering and vantage point watches.	RSPB advice to include survey for migratory waterfowl was contrary to the response from NatureScot who agreed with the approach to scope out (below). Further information provided by the Applicant in a response to the scoping response, justifying this approach was sent on 09/06/2020. The RSPB were included with NatureScot in an interim report consultation where the Applicant justified the one-year survey approach.
	12/08/2020	After reading the interim report and taking account of NatureScot's response the RSPB agreed that one year of survey work would be adequate.	None required.
Scottish Natural Heritage/Nature Scot	13/05/2020	NatureScot agreed that impacts on listed SPAs and on migratory waterfowl could be scoped out. However, they advised that it could not at this stage support the assumption that one year of bird survey work was sufficient but would be pleased to receive interim reports during the first year of survey upon which they could advise further.	Interim report issued July 2020.
	04/08/2020	After reading the interim report NatureScot agreed that a single year of bird survey work was appropriate for this site.	None required.

Table 8.1: Consultation Responses

8.4 Assessment Methodology and Significance Criteria

8.4.1 Study Area

18. It is important to note that Vantage Point (VP) locations for the flight activity surveys were identified at the outset of the ornithological survey programme when the Proposed Development was represented by a larger red line boundary (the Initial Site Feasibility Study Area) as shown in **Figure 8.1 Flight Activity Survey Vantage Point Locations and Viewsheds**. However, once the survey programme was underway, and before the commencement of the breeding season surveys, the site boundary was reduced to a refined Developable Area on which the survey areas for all other surveys were based, as shown in **Figure 8.2 Targeted Ornithological Survey Areas.**

19. Surveys to inform this assessment were undertaken based on a Developable Area before the layout of the Proposed Development was finalised. Surveys of the Developable Area and additional buffers (collectively, the Survey Areas) were undertaken. The buffers varied in extent dependent on the ornithological receptors under consideration. Survey Areas were determined based on pertinent guidance (SNH, 2017) and on data gathered for the desk study indicating which sensitive species were likely to occur.

20. The following Survey Area extents are applicable to this assessment:

- flight activity survey: Site Feasibility Study Area plus 500m buffer;
- moorland breeding bird survey and nightjar: Developable Area plus 500m buffer;
- black grouse: Developable Area plus 1.5km buffer; and
- scarce breeding raptor: Developable Area plus 2km buffer.

8.4.2 Desk Study

21. A desk study was undertaken at the outset of the survey programme to identify statutory ornithological designated sites of nature conservation interest located within, in proximity, or potentially connected to the Site.

22. The extent of searches conducted for statutory European/International designated sites (i.e. SPAs and Wetlands of International Importance (Ramsar Sites)) was dependent on their proximity and/or potential connectivity to the Site. This included direct connectivity, such as via watercourses, or indirect connectivity, such as through the potential use of habitats within the Site by qualifying species of designated sites in the wider surrounding area based on those species' recognised foraging/commuting ranges (e.g. as detailed in SNH (2016a)). Consequently, searches extended up to 20km from the Site Boundary based on the longest recognised commuting distance which is for pink-footed geese and greylag geese; species which are associated with several designated sites in Scotland. Searches for all other designated sites with ornithological features of interest (including Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs)) extended to 2km from the boundary of the Site.

23. Searches were conducted using the following sources:

- NatureScot Sitelink database website[1];
- Natural England's MAGIC Map application[2]; and
- Joint Nature Conservation Committee (JNCC)[3] website.

24. To help inform the ornithological survey programme and this assessment, a consultation exercise was also undertaken to request recent historical records of protected and notable species of conservation concern (i.e. records of target species from the past 10 years (2010-2019 inclusive)) within 2km of the Site. The following land management organisations and ornithological interest groups were consulted for any relevant data they may hold:

- Forestry and Land Scotland (FLS: land owners of the Site);
- Dumfries and Galloway Raptor Study Group (D&GRSG);
- RSPB Conservation Data Management Unit;
- South West Scotland Environmental Information Centre (SWSEIC); and
- Scottish Ornithologists' Club (SOC) bird recorder for Dumfries and Galloway.

25. Data was also made available from the Applicant for the operational Harestanes Windfarm including conditioned post-construction goshawk monitoring survey reports undertaken between 2014 and 2018 inclusive (RPS, 2014; NRP, 2015 and Arcus 2016-2018).

26. Data obtained from the above sources was used to inform the field surveys as and when it became available (e.g. to locate recent historical scarce raptor nest sites or black grouse lek sites).

8.4.3 Field Surveys

27. Surveys were undertaken using standard industry guidance informed by the results of the desk study and consultation. A list of target species was determined based on species falling within at least one of the following categories:

- birds listed on Annex I of the EU Birds Directive;
- birds listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended);
- birds that are qualifying features of European designated sites of nature conservation importance for birds (i.e. SPAs and Ramsar Sites) in proximity or potentially connected to the Site; and
- red-listed Birds of Conservation Concern (BoCC) (Eaton *et al*., 2015).

28. Other species which are typically recognised as being potentially vulnerable to the effects of wind farm developments, but which do not fall under any of the above categories, such as certain wader and waterfowl species were also recorded as target species (e.g. snipe, oystercatcher and mute swan).

29. Full details of the survey methods used to inform this assessment are presented in **Appendix 8.1 Ornithological Technical Report** with an overview of survey methods provided below:

- flight activity surveys following SNH (2017). The data from the flight activity surveys was used to undertake Collision Risk Modelling (CRM) using the Band *et al.* (2007) method to predict mortality rates from collisions;
- scarce breeding raptor survey based on Hardey *et al.* (2013) and Gilbert *et al.* (1998);
- lekking black grouse surveys following Gilbert *et al.* (1998);
- breeding nightjar surveys following Gilbert *et al.* (1998); and
- moorland breeding bird surveys using a modified version of Brown and Shepherd methodology (Brown and Shepherd, 1993) as summarised in Gilbert *et al.* (1998).

8.4.4 Assessment Methodology

30. Assessment of the significance of effects on ornithological receptors is based on the staged process outlined in the ecological impact assessment guidelines from the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018). The stages in the assessment are as follows:

- identifying and characterising impacts and their effects;
- incorporating measures to avoid and mitigate adverse impacts and their significant effects;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset significant residual effects; and
- identifying opportunities for ecological enhancement.

8.4.4.1 Significance Criteria

31. Evaluation of the ornithological resources identified by the baseline studies as 'Valued Ornithological Receptors' (VORs) has been guided by the CIEEM (2018) guidelines. In accordance with these guidelines, the importance of each VOR has been assessed in relation to the conservation status of the species over the full range of geographical scales as listed below in **Table 8.2**. These correspond with the categories of conservation value/importance referred to in the Significance of Effects matrix **Table 8.5**.

Conservation Importance (Sensitivity)	Conservation Value	Examples
High	International	An internationally designated site (e.g. SPA) as designated under the EU Birds Directive or Ramsar, candidate sites, qualifying features connected to a nearby SPA, or an area meeting the criteria for an international designation. A regularly occurring, nationally important population of any species listed under Annex I of the EU Birds Directive, or regularly occurring migratory species connected to an SPA designated for this species under the EU Birds Directive.
	National	A nationally designated site, or area meeting the criteria for national level designations (e.g. SSSI or NNR). A regularly occurring, regionally important population of any species listed under Schedule 1 of the Wildlife and Countryside Act or Annex I of the EU Birds Directive, or species represented on the red list of Birds Conservation Concern or Scottish Biodiversity List. A nationally rare species (<300 breeding pairs in the UK).

[1] NatureScot Sitelink database website (https://sitelink.nature.scot/home)
[2] Natural England MAGIC Map application website (https://magic.defra.gov.uk/).
[3] JNCC website (http://jncc.defra.gov.uk/).

Conservation Importance (Sensitivity)	Conservation Value	Examples
Medium	Regional	A regularly occurring, locally important population of any species listed under Schedule 1 of the Wildlife and Countryside Act or Annex I of the EU Birds Directive, or species represented on the Scottish Biodiversity List. Sites which exceed the local authority-level designations but fall short of SSSI selection guidelines. A species for which a significant proportion (>1 %) of the regional population is found within the site.
Low	District	LNRs, Sites of Importance for Nature Conservation (SINCs) or equivalent sites selected on local authority criteria (e.g. Scottish Wildlife Trust (SWT) Wildlife Sites or Reserves). Other species of conservation concern, including species represented on the amber-list of Birds Conservation Concern or listed under the Local BAP (LBAP).
	Local	All other species that are widespread and common and which are not present in regionally or nationally important numbers which are considered to be of limited conservation importance (e.g. amber or green-listed Birds of Conservation Concern).

Table 8.2 Approach to Classifying the Importance of Valued Ornithological Receptors

32. These criteria are intended as a guide and are not definitive. Attributing a value to a receptor is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of a value level. For example, qualifying species of SPAs designated under the EU Birds Directive are implicitly of European (i.e. International) importance. Professional judgement is therefore important when attributing a level of value to species or individual habitat in non-designated areas. In these cases, reference has also been made to respective national and regional populations and population trends.

33. The EIA Regulations require consideration of the types of effect in terms of how they arise, whether they are beneficial or adverse, and their duration. The nature of each of these effects is defined in **Table 8.3**.

34. The potential effects are determined through understanding how each VOR is likely to be affected by a development. The elements used to define the scale of the effect of a development include:

- the potential types of effect (as detailed in **Table 8.3**);
- the scale/magnitude of the predicted effect (as detailed in **Table 8.4**); and
- whether there are any cumulative effects that may affect the long-term integrity of the ecosystem(s) at the site.

Effect	Description
Direct	Effects arising immediately as part of the proposed development.
Indirect	Effects not caused immediately by the proposals but arising as a consequence of it (e.g. habitat change which may not directly affect a top-level predator, but which causes a reduction in the presence of their prey species).
Secondary	Additional effects resulting as a consequence of one or more direct effects (e.g. the combined effects of habitat loss and displacement).
Temporary	Effects which cause a change to the baseline for a limited period.
Permanent	Effects causing an irreversible change to the baseline.
Cumulative	Effects which arise from multiple types of effect on a particular receptor. These may overlap spatially or temporally.
Short-term	These temporal scales are defined within each topic assessment at levels appropriate to the receptor being assessed.
Medium-term	
Long-term	

Effect	Description
Beneficial	Effects having a beneficial influence on the environment.
Adverse	Effects having an adverse influence on the environment.

Table 8.3 Types of Effects

Magnitude	Description
Large	Major effects on the feature/population, which would have a sufficient effect to irreversibly alter the nature of the feature in the short-to-long term and affect its long-term viability, for example more than 20 % habitat loss or damage.
Medium	Effects that are detectable in short and long-term, but which should not alter the long-term viability of the feature/population, for example between 10 – 20 % habitat loss or damage.
Small	Minor effects, either of sufficiently small-scale or of short duration to cause no long-term harm to the feature/population, for example less than 10 % habitat loss or damage.
Negligible	A potential effect that is not expected to affect the feature/population in any way; therefore, no effects are predicted.

Table 8.4 Criteria for Describing Spatial Magnitude

35. The level of a potential effect on each VOR was determined by considering the type and magnitude of the effect (**Table 8.3 and Table 8.4**) in relation to the conservation importance (sensitivity) of the VOR (**Table 8.2**). The significance of the of effect is described as Substantial, Moderate, Slight or Negligible, or within a range (e.g. Substantial - Moderate) as illustrated in **Table 8.5**.

Magnitude of Change / Effect	Conservation Value/Importance of VOR (Sensitivity)				
		High	**Medium**	**Low**	**Negligible**
	Large	Very substantial or substantial	Substantial or moderate	Moderate or slight	Negligible
	Medium	Substantial or moderate	Moderate	Slight	Negligible
	Small	Moderate or slight	Slight	Slight or negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Table 8.5 Establishing the Significance of Effect

36. Explanations of the levels of significance are provided below in **Table 8.6**.

Level of Effect	Criteria
Very substantial	Only adverse effects are assigned this level of importance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of international, national or regional importance that are likely to suffer a most damaging effect and loss of resource integrity. A major change at a regional or district scale site or feature may also enter this category.
Substantial	These beneficial or adverse effects are likely to be very important considerations at a local or district scale and, if adverse, are potential concerns to the scheme and may become material in the decision-making process.
Moderate	These beneficial or adverse effects while important at a local scale are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may influence decision making if they lead to an increase in the overall adverse effects on a particular area or on a particular resource.

Level of Effect	Criteria
Slight	These beneficial or adverse effects may be raised as local factors but are unlikely to be of critical importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the scheme and consideration of mitigation or compensation measures.
Negligible	No effect or an effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects are not normally considered by the decision maker.

Table 8.6 Level of Significance Criteria

37. The level of significance generated from **Table 8.6** was then assessed against the likelihood of such predictions occurring, and the confidence level of the effect on a population, based on expert judgement and evidence from the existing literature. A scale of confidence, as recommended by IPCC (2010) can then be used:

- virtually certain: >99 % probability of occurrence;
- very likely: >90 % probability;
- likely: >66 % probability;
- about as likely as not: 33-66 % probability;
- unlikely: <33 % probability;
- very unlikely: <10 % probability; and
- exceptionally unlikely: <1 % probability.

38. Where the assessment criteria arrive at an effect of variable level (e.g. 'Substantial or Moderate', see **Table 8.5**), then the outcome is defined either by taking a precautionary, worst case scenario approach or where possible by applying professional judgement taking into consideration specialist knowledge of the receptor in question and confidence in the prediction.

39. In relation to the EIA Regulations, those effects defined as being of 'Moderate' or greater are considered to have the potential to result in a significant effect, defined against the relevant conservation value of the VOR (**Table 8.2**) and magnitude of the effect (**Table 8.4**). In the case of 'Moderate' adverse effects, further evidence needs to be provided to show that an identified effect is likely to be 'tolerable' - if it is, then a significant effect would not result.

40. The issue of what is a 'tolerable' level of effect has not been specifically defined here, although it is generally accepted that populations or habitats usually have a threshold for absorbing deterioration and a certain capacity for self-regeneration. Therefore, to be tolerable (and thus avoiding a significant effect), it should be demonstrated that the magnitude of any losses is within the regenerative capacity of the reference population or habitat to be absorbed and result in the population or habitat extent remaining viable over the long-term.

41. Results that are 'Slight' or 'Negligible' effects arising from the development are not considered to be significant (in terms of the EIA Regulations).

42. The effects on a species may be assessed at several scales, ranging from local or regional to national or even international. Where an identified effect is not considered significant at a national level for instance, it may be so at a regional level. The focus of the impact assessment would however be at the wider spatial levels (i.e. regional, national or international). Indeed, NatureScot typically consider Natural Heritage Zones (NHZs) to be the most appropriate regional biogeographic level against which to assess impacts on breeding bird populations, while for non-breeding migratory species effects at the national level are more appropriate (SNH, 2018). This corresponds with SNH policy (2018) which states that: "*We will not normally object to a wind farm proposal on account of purely local or regional impacts, provided these do not affect populations protected within a protected area*." These conditions highlighted by NatureScot have been considered in the impact assessment process so that no potentially significant effects are omitted.

8.4.5 Limitations to Assessment

43. Like most outdoor activities in 2020, the breeding season survey programme for the Proposed Development has been affected to some extent by the global Coronavirus (Covid-19) pandemic, but only partially and predominantly during the initial weeks of public lockdown (i.e. late March to the end of April). During this time, surveys were postponed while potentially acceptable, alternative ways of continuing some reduced-scope field surveys safely and responsibly were investigated.

44. Due to the rural setting of the Site and the isolated nature of the ornithological surveys it was possible to continue with the majority of surveying and achieve a large proportion of the scheduled ornithological surveys during the critical early stages of the breeding season. Ultimately, the minimum survey effort requirements have been achieved across the season, as presented in **Appendix 8.1 Ornithological Technical Report**. Therefore, it is considered that Covid-19 restrictions have not resulted in significant limitations to assessing the ornithological baseline within the Study Area.

8.5 Baseline Conditions

8.5.1 Consultation and Designated Sites

45. Two internationally designated sites of ornithological interest were identified within 20km of the Site Boundary. Details of each of these sites are presented in **Table 8.7** while their locations and distribution in relation to the Site are shown in **Figure 8.3 Ornithological Designated Sites and Natural Heritage Zone.**

46. The Site Boundary does not physically overlap with any internationally or nationally designated sites. The nearest designated site, Castle Loch, Lochmaben, lies approximately 9.5km south east of the Site Boundary and is designated for its non-breeding population of pink-footed goose.

Site	Distance from the Site	Qualifying interest
Castle Loch, Lochmaben SPA and Ramsar Site	9.5km	Non-breeding: pink-footed goose
Upper Solway Flats and Marshes SPA and Ramsar Site	17.5km	Non-breeding: bar-tailed godwit, cormorant, curlew, dunlin, golden plover, goldeneye, grey plover, knot, lapwing, oystercatcher, pink-footed goose, pintail, redshank, ringed plover, scaup, shelduck, Svalbard barnacle goose, waterfowl assemblage, whooper swan. Passage: ringed plover.
		Non-breeding: bar-tailed godwit, curlew, knot, oystercatcher, pink-footed goose, pintail, redshank, scaup, Svalbard barnacle goose.

Table 8.7 Designated Sites

47. Solway Flats and Marshes lies approximately 17.5km south of the Site Boundary and is designated for non-breeding populations of wading and waterfowl species, most notably of which is pink-footed goose due to their potential connectivity with the Site.

48. There are no non-statutory designated sites with ornithological interests within 2km of the Site.

8.5.2 Protected and Notable Species of Conservation Concern

49. A summary of records derived from data sources described in **Section 8.4.2**, is provided below with further details available in **Appendix 8.1 Ornithological Technical Report** and **Appendix 8.2 Ornithological Confidential Appendix**:

- Goshawk: one nest site within the Initial Site Feasibility Study Area and a minimum of three nest sites within 2km of the Site. The most recent record was two occupied territories in 2019;

- Peregrine: two territories within 2km of the operational Harestanes Windfarm with at least one being apparently occupied in 2003. However, there were no recent records of breeding activity;
- Hen harrier: up to two territories within 2km of the operational Harestanes Windfarm site, with at least one being apparently occupied in 2003. However, there were no recent records of breeding activity;
- Short-eared owl: one pair were reported to have bred within the operational Harestanes Windfarm site in 2003. However, there were no recent records of breeding activity;
- Barn owl: up to ten nest sites, two within the Initial Site Feasibility Study Area and eight located within 2km of the Initial Site Feasibility Study Area. The most recent record involved two occupied nest sites in 2019;
- Black grouse: numerous undated records of black grouse, only one record apparently related to a well-attended lekking site, located approximately 1.7km to the north west of the InitialSite Feasibility Study Area.
- Golden plover: territories were located on the open moorland habitats surrounding the operational Harestanes Wind farm site in 2002 and 2003;
- Curlew: territories were located on the open moorland habitats surrounding the operational Harestanes Windfarm site in 2002 and 2003;
- Lapwing: three records of up to two birds to the east and south west of the Initial Site Feasibility Study Area, near Courancehill/Tawnaze Hill and Ae; and
- Common crossbill: twenty-five records of birds associated with the Forest of Ae.

8.5.3 Field Survey Results

50. A summary of field survey results is provided here with full details provided in **Appendix 8.1 Ornithological Technical Report**.

51. The field survey results are illustrated in **Figures 8.4 - 8.8** (Flight Activity Survey Results, Scarce Raptor Survey Results and Breeding Bird Territories).

8.5.4 Flight Activity Survey

52. A total of 160 flights by 12 target species were recorded over and around the Site during the flight activity surveys between September 2019 and August 2020. A summary of flight activity results is provided below and should be cross referenced with **Figures 8.4 – 8.6** (Flight Activity Survey Results). The number of flights at Potential Collision Height (PCH) is included, i.e. the number of flights at risk of collision with turbines.

- Goshawk: 77 flights involving 86 individuals, eight flights at PCH;
- Pink-footed goose: 25 flights involving 2,220 individuals, two at PCH;
- Red kite: 18 flights involving 19 individuals, no flights at PCH. The majority of flights occurred over agricultural habitats and along forest edges outwith the Site;
- Hen harrier: ten flights involving ten individuals, one flight at PCH. Flight activity was concentrated over the forestry in the eastern part of the Site and adjacent agricultural land and moorland. This species was only recorded during the non-breeding season;
- Snipe: eight flights involving eight individuals, no flights at PCH. All flights were over agricultural and moorland habitats outwith the Site;
- Lapwing: seven flights involving nine individuals, no flights at PCH. All flights were located in agricultural habitats outwith the Site;
- Greylag goose: four flights involving 23 individuals, one flight at PCH;
- Oystercatcher: four flights involving four individuals, no flights at PCH. All flights were outwith the Site;
- Golden plover: three flights on the same day, each comprising what were presumably the same 18 individuals (i.e. 54 'individuals' in total), one flight at PCH. All flights located over the moorland and forest edge to the north of the Site;
- Merlin: two flights involving two individuals, no flights at PCH. Both flights occurred during the breeding season with one passing over the southern-central part of the Site and the other passing over the agricultural land to the south;
- Peregrine: one flight (not at PCH) involving a single individual passing over the Site during the breeding season; and
- Whooper swan: one flight (not at PCH) involving a single individual flying down the Water of Ae valley during the non-breeding season.

8.5.5 Scarce Breeding Raptor Survey

53. Two active goshawk nests were located within the Scarce Breeding Raptor Survey Area. These nest sites were within approximately 1km of two of the recent historical nest site locations provided by FLS and so it is considered highly likely that these are alternative nest sites for the associated pairs. Both nest sites were located outwith the Developable Area and over 1km from the nearest turbine locations. Further details are provided in **Appendix 8.2 Ornithological Confidential Appendix**, with other scarce raptor observations being presented in **Figure 8.7 Scarce Raptor Survey Results**.

54. No active nests of any other target raptor species were recorded in the Survey Area.

55. Additionally, there were incidental observations, made during other surveys, of the following bird of prey species:

- Barn owl: two Juvenile barn owls were noted during the walk in to the VP 13 on 20 May, approximately 1.9km from the Site. A bird was also observed along the western boundary of the Site Feasibility Study Area, to the north of Ae on 16 July and one was noted hunting near Main Rig on the same date, both observations were recorded during nightjar surveys and were outwith the Site; and
- Long-eared owl. Three incidental observations were made during nightjar surveys. A begging Juvenile heard on the edge of the forestry to the north of Main Rig along the eastern boundary of the Site, approximately 300m from the nearest turbine location, on 17 June and a bird "investigated" a surveyor in the Tawnaze Hill area, approximately 850m from the Site.

8.5.6 Lekking Black Grouse Survey

56. No black grouse (lekking birds or incidental sightings) were recorded during any of the surveys undertaken within the black rouse survey area.

8.5.7 Breeding Nightjar Survey

57. No nightjar were recorded during any of the surveys undertaken within the nightjar survey area.

8.5.8 Moorland Breeding Bird Survey

58. A total of 14 target species were recorded. Of these, only red kite and barn owl were Annex I and/or Schedule 1 listed species, neither of which were found to be holding breeding territories within the survey area. The remaining 12 target species were either red-listed and/or SBL species. **Table 8.9** below presents estimated territory numbers for target species, the distribution of which are shown in **Figure 8.8 Breeding Bird Territories**.

Species	Conservation Status			Presence/Min. No. of Breeding Territories within the Survey Area
	EU Annex I	WCA Sch. 1	BoCC Red-list	
Barn owl		✓		Pellets only
Cuckoo			✓	1
Curlew			✓	1
Lapwing			✓	1
Lesser redpoll			✓	Present
Linnet			✓	2
Mistle thrush			✓	Present
Red kite	✓	✓	✓	Present
Skylark			✓	13
Snipe			✓	2
Song thrush			✓	2
Spotted flycatcher			✓	Present
Tree pipit			✓	1

Table 8.9: Estimated Number of Territories for Target Species from Moorland Breeding Bird Survey

8.5.9 Receptor Sensitivity

8.5.9.1 Designated Sites and their Connectivity to Harestanes South Windfarm

59. The two designated sites referred to in **Table 8.7** are given preliminary assessment as VORs.

60. As noted previously the Site does not overlap with any statutory or non-statutory designated sites of ornithological interest. The Site is located approximately 9.5km northwest of Castle Loch, Lochmaben SPA/Ramsar site designated for non-breeding populations of pink-footed goose and 17.5km north of the Upper Solway Flats and Marshes SPA/Ramsar designated for non-breeding populations of waterfowl, notably pink-footed goose.

61. Although there was potential for connectivity with qualifying populations of pink-footed geese from these two SPAs, survey and desk study evidence (set out in **Appendix 8.1 Ornithological Technical Report)** demonstrates that geese from these SPAs don't use habitats in proximity of the Site and the flight activity over the Site was minimal. This was agreed by NatureScot and RSPB as per **Table 8.1**.

8.5.9.2 Protected and Notable Species of Conservation Concern

62. A total of 23 species met at least one of the target species criteria identified in **Section 8.4.3** and therefore constitute the preliminary list of VORs of the Proposed Development. A summary of their presence, conservation value, and a rationale for scoping in or out is given in **Table 8.10**.

63. The aim of the Ecological Impact Assessment (EcIA) is to report on "likely" significant effects, based on the EIA Regulations guidance, rather than every conceivable effect. As such, a number of species were scoped out from the impact assessment as the baseline survey results indicated that significant effects were not likely to occur at a regional scale or above (for example if no breeding was recorded and site occurrence was rare). Consequently, such effects do not require assessment under the terms of the EIA Regulations and SNH (2018b) guidelines.

64. Although a number of the species that have been scoped out through the above process are red or amber-listed species of conservation concern (Eaton *et al*. 2015) and/or are represented on the Scottish Biodiversity List/Dumfries and Galloway LBAP, and would therefore generally be considered to be of regional conservation value (see **Table 8.2**) the conservation status of these species reflects a decline in numbers rather than rarity or a concentration of population in a few sites and in fact they remain relatively common and widespread in the UK. Even though some of these species (e.g. lapwing, skylark and song thrush) were identified as breeding or at least being present within the study area, they occurred in very low numbers (absolutely and/or relative to national and regional populations) in an area of limited habitat suitability which was located outwith the Proposed Development footprint.

65. SNH (2018b) states that "We will only object to a proposal outside a protected area when we consider the consequences of an approval raise issues of national interest". This can reasonably be expanded to include Scottish Biodiversity List or red-listed species, such as those mentioned above, that are included in their respective classification based on a relative decline in numbers from a high baseline rather than an inherent rareness at a national level. Consequently, such target species were omitted from the impact assessment where their occurrence relative to the Proposed Development was of no more than Local importance.

Species or Species Assemblage	Recorded Presence	Conservation Value in Context of the Site	Scoped IN/OUT of Assessment	Rationale
Barn owl (pellets)	**MBBS:** pellets recorded	**Site:** Local/Low	OUT	Pellets located outside a suitable structure for breeding and two Juvenile birds observed at another location. However, the location of the pellets was approximately 870m from the nearest turbine location and approximately 700m from the nearest access track. The observation of two Juveniles was approximately 870m from the Site boundary. Collision risk is considered unlikely due to the suboptimal foraging conditions (mature coniferous forestry and clear fell) within the Site compared to that available outwith comprising grassland. Furthermore, barn owls are rarely impacted by collision risk from windfarm developments due to their flight behaviour which typically involves foraging at low levels, less than 3m above the ground (Barn Owl Trust Website). If these locations represent breeding sites, disturbance and displacement impacts from construction activities to facilitate the Proposed Development are unlikely given the distance from the windfarm infrastructure. Shawyer (2012) recommends a minimum protection zone for barn owl nest sites from continuous heavy construction works of 175m, the distance from the location of barn owl signs and the observation of two Juvenile birds relative to the Site significantly exceeds this recommended protection zone.
Breeding passerine (songbird) assemblage	**MBBS:** eight species recorded	**Site:** Local/Low	OUT	Territories for eight passerine species were located outwith the Site, at considerable distance from the Proposed Development footprint on moorland habitat or along the forest edge. All species were recorded in low numbers compared to reference populations, two of the eight species were only recorded flying over, a further five species had estimates of no more than two territories within the Survey Area. An eighth species, skylark, had an estimate of 13 territories within the Survey Area which still represents low abundance in comparison to reference populations; the Scottish population was estimated at 290,000-557,000 pairs (Forrester *et al*, 2007). The Dumfries and Galloway bird report for 2016 shows 300 records from 70 locations within 38 10km squares with a peak breeding season count of 375 birds at Wildfowl and Wetlands Trust (WWT) Caerlaverock in June. Passerines are generally not considered at risk of significant impacts from windfarm developments (SNH, 2017).
Breeding wader assemblage	**MBBS:** three species recorded **FAS:** four species recorded, all	**Site:** Local/Low	OUT	Single territories recorded for curlew and lapwing (both red listed within BoCC4) and two territories for snipe (amber listed). All territories were located out with the Site and all represent low abundance compared to reference populations. Scottish breeding population estimates were 58,800 pairs, 71,500-105,600

Species or Species Assemblage	Recorded Presence	Conservation Value in Context of the Site	Scoped IN/OUT of Assessment	Rationale
	species with <ten flights in total			pairs and 42,000-50,000 pairs for curlew, lapwing and snipe respectively (Forrester *et al*, 2007). Waders are potentially at risk of impacts from the Proposed Development through collision with wind turbines. However, there was a low amount of flight activity from the species recorded during the FAS (golden plover, lapwing, oystercatcher and snipe) and most flights were over open areas of grassland/moorland habitat located outwith the Site; the Site does not present suitable habitat for waders as it comprises coniferous forestry.
Goshawk	**SBRS**: two active nest site locations **FAS:** 77 flights, eight at PCH	**Site:** Regional/Medium	IN	Two active nest sites were located within the SBRS Area. Although both nest sites were located outwith the Site and over 1km from the nearest turbine location, taking consideration of this species flight behaviour and relatively large home range, goshawk may be at risk of effects from the Proposed Development through collision with wind turbines and through disturbance/displacement. Furthermore, the two territories within the Survey Area represent 8% of the regional population which was estimated at 26 pairs in 2017 (Holling and the Rare Breeding Birds Panel (RBBP) 2017).
Greylag Goose	**FAS:** four flights with one at PCH	**Site:** Negligible	OUT	Recorded rarely and in low abundance passing over the Site only with negligible risk of collision mortality.
Hen harrier	**SBRS**: no evidence of breeding **FAS:** ten flights, one at PCH	**Site:** Local/Low	OUT	All activity for this species was in the non-breeding season, with no evidence of breeding in the SBRS Survey Area. Furthermore, although two flights were on the periphery of the Site, most flights were located outwith the Site.
Long-eared owl	Incidental observations during nightjar survey	**Site:** Local/Low	OUT	Coniferous forestry within and surrounding the Site presents suitable nesting habitat for long-eared owl and incidental records suggest breeding in the wider area. However, this species has favourable conservation status and is green listed within BoCC4. Furthermore, collision with turbines is unlikely given the species flight behaviour involving low level foraging flights.
Merlin	**SBRS**: no evidence of breeding **FAS:** two flights, none at PCH	**Site:** Negligible	OUT	No evidence of breeding within the SBRS Survey Area, there was a low amount of flight activity recorded with a total of two flights, only one of these was over the Site.
Peregrine	**SBRS**: no evidence of breeding **FAS:** one flight, not at PCH	**Site:** Negligible	OUT	Recorded rarely and in low abundance, passing over the site only with negligible risk of collision mortality.
Pink-footed Goose	**FAS:** 25 flights, two at PCH	**Site:** Negligible	OUT	Recorded rarely and in low abundance, passing over the Site only with negligible risk of collision mortality. No evidence of connectivity with qualifying populations for SPA's in the wider region as discussed in **Section 8.5.9.1.**
Red kite	**SBRS:** no evidence of breeding **FAS:** 18 flights, none at PCH	**Site:** Local/Low	OUT	This species was not confirmed as breeding within the SBRS Survey Area, there was a relatively high amount of flight activity recorded for red kite with a total of 18 flights but none were at collision risk and all of which were on the periphery of the FAS Survey Area, no flights were recorded over the Site.
Whooper Swan	FAS: one flight, not at PCH	**Site:** Negligible	OUT	Recorded rarely and in low abundance, with negligible risk of collision mortality.
Key to Recorded Presence **SBRS:** Scarce Breeding Raptor Survey, **MBBS:** Moorland Breeding Bird Survey, **FAS:** Flight Activity Survey.				

Table 8.10: Valued Ornithological Receptors Within the Survey Area.

66. After the preliminary assessment of VORs outlined in **Table 8.10** one VOR remains scoped in for further assessment; goshawk.

8.5.10 Reference Populations and Conservation Status of the Scoped in VOR: Goshawk

67. The level of a potential effect on the VOR was determined by considering the magnitude, extent and duration of the effect in relation to the conservation importance (sensitivity) of the VOR within the context of the reference population.

68. SNH (2018b) recommends that, "the concept of favourable conservation status of a species should be applied at the level of its Scottish population, to determine whether an impact is sufficiently significant to be of concern. An adverse impact on a species at a regional scale (within Scotland) may adversely affect its national conservation status. This is a test which makes good ecological sense and maintains compatibility with the aims of European legislation and Government policy. An impact should therefore be judged as of concern where it would adversely affect the existing favourable conservation status of a species or prevent a species from recovering to favourable conservation status, in Scotland".

69. This is likely to be the case where a substantial or moderate adverse effect (or higher), not likely to be tolerable, is predicted using the assessment methodology discussed in **Section 8.4.4**, although expert judgement is applied in all cases.

70. The term 'favourable conservation status' (as articulated within the Habitats Directive) is defined by SNH (2018b) as "the sum of influences acting on a species which may affect its long-term distribution and abundance, within the geographical area of interest (which for the purposes of the Directive is the EU)". This interpretation has become increasingly common in court within the context of the Birds Directive. Conservation status is favourable when:

- population dynamics indicate that the species is maintaining itself on a long-term basis and is therefore likely to persist in the habitat it occupies;
- the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and
- There is (and would probably continue to be) a sufficiently large habitat to maintain its populations on a long-term basis.

71. The conservation status of each VOR is therefore considered at the international, national and/or regional scale, depending on whether the population is breeding, migratory or overwintering. For non-breeding or migratory species, consideration at a national scale is more appropriate than at regional level or lower (SNH, 2018).

72. For breeding birds, the regional scale equates to SNH's Natural Heritage Zones (NHZ), where there is high biogeographical coherence within each zone, this scale is appropriate for goshawk. In this case, the Proposed Development lies within the Western Southern Uplands & Inner Solway (NHZ 19). The extent of these NHZs and the location of the Proposed Development within/between them is presented in **Figure 8.3 Ornithological Designated Sites and Natural Heritage Zone.** Other populations (e.g. Scottish Raptor Study Group survey areas) would however be considered where appropriate.

73. In order to determine whether the conservation status of a species' population would be adversely affected, it is necessary to obtain the best data on the VOR's current population and recent trends. These are presented below.

74. Goshawk is listed in Schedule 1 of the Wildlife and Countryside Act, although it is green listed in the latest BoCC report (Eaton *et al*, 2015) due to its expansion since the mid-20th century. The 25-year UK trend is a strong increase which was noted as +214% in 2017, and there are thought to be within the range of 460-684 breeding pairs in the UK (Holling and the RBBP, 2017). The RBBP reports from 2015-2017 detail a stable range of 165-174 total pairs (including territorial presence where no breeding was confirmed) for the whole of Scotland.

75. In an assessment specific to bird populations within NHZ's (Wilson *et al*, 2015) the goshawk breeding population in NHZ 19, Western Southern Uplands & Inner Solway, relevant to the Proposed Development, was estimated at 31 pairs. In the case of NHZ 19, the area of coverage effectively aligns with the region of Dumfries and Galloway, except for a small part of the western coastal extremities that fall within NHZ18, Wigtown Machars and Outer Solway, largely comprised of coastal habitats unsuitable for breeding goshawk. Therefore, the population estimate for NHZ 19 is expected to align with those for the Dumfries and Galloway region which is confirmed from other data sources (e.g. Holling and the RBBP, (2017) report annual estimates) of between 26 and 32 total pairs during 2015 to 2017 in the region. The annual report for 2018 from the Scottish Raptor Monitoring Scheme (SRMS, 2018), details similar estimates of breeding pairs for Dumfries and Galloway as those detailed by the RBBP; 22 home ranges were occupied by pairs of goshawks in 2018.

76. The goshawk population estimates detailed above are almost certainly underestimates given this species' secretive nature and choice of nest location in dense coniferous forestry. Local raptor study groups are the main source of data for population estimates of goshawk, but it is unlikely that they would be aware of all pairs in a region each year due to geographic coverage limitations and time constraints. County estimates of pairs provided to RBBP by county recorders which take account of a variety of data sources, suggest that the UK population could be nearer to 1,000 pairs and the Scottish population could be around 267 pairs, including an estimate of 131 pairs in Southern Scotland, incorporating the Dumfries and Galloway region (Holling and the RBBP, 2017).

77. Based the above information, goshawk is considered to have a favourable conservation status at a national, regional (Dumfries and Galloway) and NHZ level and as such is assessed as being a VOR of regional conservation value while the site is considered to be of local importance for the species.

8.6 Potential Effects

8.6.1 Description of Potential Effects

78. Effects are considered for the construction and operational phases of the Proposed Development. The different potential effects to be considered are described below for each of these phases, with the assessment of the different effects presented for the one species taken forward for assessment, goshawk.

8.6.2 Construction

8.6.2.1 Habitat Loss

79. Direct habitat loss through windfarm construction may result in loss or fragmentation of nesting or foraging habitat for bird species. In the context of wind farms, this is generally considered to be of low magnitude, as construction usually only involves small losses of land associated with turbine bases, access tracks and other infrastructure compared to the overall foraging extent of many key species (Drewitt and Langston, 2006). An exception to this may be, for example, where the felling of a tree would result in the loss of a traditional raptor nest.

80. With respect to birds, in most cases physical land take is likely to be considerably less than any effective habitat loss due to displacement from the windfarm site. Effects may be more widespread if developments interfere with hydrological patterns of wetland or peatland sites and associated bird species (Drewitt and Langston, 2006).

81. Habitat within the Site is generally not considered of high value for birds at a regional or larger scale. The predominant Phase 1 habitat type is coniferous plantation woodland which is of low conservation value for most VORs, either for breeding or foraging. However, the habitat is of high value for nest sites and as a foraging resource for goshawk, the single species taken forward for assessment.

82. In relation to the Site, it is important to acknowledge that Proposed Development will be located within a commercial forestry plantation which will be subject to habitat loss and modification through planned felling and restocking over the course of the windfarm's lifespan. Such impacts are expected to occur at much greater scale and may be reasonably assumed to have correspondingly larger effects on associated VORs than those associated with the Proposed Development. It is necessary therefore, to consider the impacts of habitat loss associated with the Proposed Development and the effects on VORs in this wider context.

8.6.2.2 Disturbance

83. Noise and visual disturbance (the presence of people and construction plant) caused by construction operations may directly displace birds from breeding sites and/or foraging areas (although the actual habitat quality remains the same) for the duration of activities, thus potentially affecting breeding success or survival. In addition to these possible effects on individuals and populations, any windfarm construction work undertaken during the bird breeding season (typically March to August, inclusive) carries a risk of destruction or damage to occupied bird nests, as well as disturbance to Schedule 1 protected species, if mitigation measures are not followed. The active nests of all wild bird species are protected by the law and it is necessary to take measures to ensure compliance with the relevant legislation (see **Section 8.7: Mitigation**).

8.6.3 Operation

8.6.3.1 Disturbance/Displacement

84. The displacement effects attributable to windfarms are site-specific and vary according to species and season. As displacement effectively leads to exclusion from areas of suitable habitat, it can be regarded as being similar to habitat loss in its effect on birds, in combination with habitat loss it can result in an increased adverse effect, as birds are not only losing habitat but are being displaced from a wider area where suitable habitat still exists that they could otherwise use. For breeding birds, displacement from nesting habitat can lead to abandonment of the territory; while loss of foraging habitat may lead to a reduction in food supply, which in turn, can lead to reduced breeding success and/or survival rates or abandonment of the territory. The implications of such displacement at the population scale, in terms of the effect on the viability of the population, depends on the importance of the area from which birds are displaced and the capacity of alternative habitats to support displaced birds.

85. Noise and visual disturbance to birds due to operational windfarms is considered to be of a much lower intensity than during construction/decommissioning phases and is limited to brief maintenance activities as well as low-level noise from normal operational turbine activity.

8.6.3.2 Collision with Turbines

86. Flying birds may collide with turbines. Collision of a bird with turbine rotors usually results in the death of the bird. Birds may also be injured or killed by flying into other components of turbines. The effect of an individual loss on a population is influenced by several characteristics of the affected population, notably its size, density, recruitment rate (additions to the population through reproduction and immigration) and mortality rate (the natural rate of losses due to death) and emigration. In general, the effect of an individual lost from the population would be greater for species that occur at low density, are relatively long-lived and reproduce at a low rate (e.g. larger raptors and geese). Conversely, the effect would often be insignificant for short-lived species with high reproductive rates found at high densities, including most passerines.

87. A total of 160 flights were recorded in the Flight Activity Survey Area for 12 target species. Goshawk flights accounted for nearly half of the flight activity (77 flights), while goshawk flights combined with three other species, pink-footed goose (25), red kite (18) and hen harrier (10) accounted for 81% of the total flights. Only one species had enough flights at PCH to allow accurate modelling of collision risk to be undertaken; goshawk with eight flights at PCH. For the remaining 11 species there were insufficient flights at PCH (all other species recorded two or less flights at PCH) and therefore too few flights to allow robust collision risk predictions to be made. As such these species were not included in the modelling process.

88. The outcome of the assessment of effects of collision mortality for goshawk is detailed below in **Section 8.6.5.2.2**.

8.6.3.3 Barrier Effects

89. Individual turbines or the whole turbine array/windfarm polygon may present a barrier to the movement of birds, restricting or displacing birds from much larger areas. Birds may avoid flying through or over windfarms by altering local flight paths or migration flyways.

90. The effect this would have on a population is subtle, and difficult to predict with any certainty. If birds must regularly fly over or around obstacles or are forced into sub-optimal habitats, this may result in greater energy expenditure (Drewitt and Langston, 2006). This would reduce the efficiency with which they accumulate energy reserves, potentially affecting their survival or breeding success.

8.6.4 Mitigation by Design and Embedded Mitigation

91. Standard best practice during the construction of the Proposed Development is required to be followed for all breeding birds to ensure that no contravention of wildlife legislation occurs.

92. Under the Wildlife and Countryside Act 1981, as amended, it is an offence with only limited exceptions, to intentionally or recklessly:

- Take, interfere with, damage or destroy the nest of any wild bird whilst it is in use or being built.
- Take, interfere with or destroy the egg of any wild bird.
- Obstruct or prevent a wild bird from using its nest.
- Disturb any wild bird listed on schedule 1 while it is nest building, or at (or near) a nest containing eggs or young or disturb the dependent young of such a bird.

93. Standard best practice for breeding birds would be followed during construction, including:

- Any tree felling or other types of vegetation removal required to facilitate the Proposed Development should be undertaken outwith the main bird breeding season (March-August inclusive).
- If works are not possible outwith the main breeding bird season, then a Suitably Qualified Ecologist (SQE) would be required to undertake bird nest checks ahead of any vegetation clearance taking place; this will include checks for nocturnal species such as long-eared owl where appropriate.
- Any nest sites identified by the SQE would be subject to a buffer of a suitable size, as determined by the SQE, within which no works can take place until the nest is confirmed as no longer in use, i.e. the young have fledged and left the nest.

8.6.5 Assessment of Potential Effects on the VOR: Goshawk

8.6.5.1 Construction

8.6.5.1.1 Direct Habitat Loss

Nest Sites

94. The two goshawk nest locations recorded in the Scarce Breeding Raptor Survey Area were outwith the Site and over 1km from the nearest turbine locations. Additional data provided by other sources (SPR, FLS) show nest sites within 350m of each other, regularly occupied by presumably the same pair of goshawks during 2014-2019 in the Whitefauld Hill area. The nest sites of the Whitefauld Hill territory are within 500-600m of the nearest turbine location. Further details provided of historic goshawk nest sites from three additional areas show these to be between 2 and 5km from the nearest turbine location. The construction of the windfarm would not result in the direct loss of any of the nest site locations discussed. Therefore, there are no predicted effects to these two nest sites (**No Effect**).

Foraging Habitat

95. Goshawk foraging habitat is largely defined by the availability of suitable prey, but typically includes a mixture of woodland and open areas including moorland and farmland (Forrester *et al*., 2007). Prey items range from small birds to medium-sized mammals such as hares although typical species include wood pigeons, corvids (e.g. crows and rooks) and thrushes (Forrester *et al*., 2007). Goshawks typically operate within a core home range of around 3km from their nest and generally range no more than 10km (SNH, 2016), thus giving a typical foraging area of around 2,827 hectares (ha) and up to 31,415ha. Foraging habitat for goshawk within the Site and the surrounding area comprises a mosaic of coniferous woodland, grazing pasture and moorland which is anticipated to provide a suitable variety and abundance of prey for this species.

96. The construction of the Proposed Development would result in the loss of certain habitats which are expected to be part of the resident goshawks' traditional foraging grounds, including intact coniferous plantation woodland and open areas of clear fell. However, the total area of permanent habitat loss would be negligible compared to the total extent of the Site and predominantly would be limited to narrow access tracks and turbine hardstandings distributed throughout the wider forest (as opposed to large swathes of habitat). Therefore, it is likely that the goshawks would be relatively undeterred from continuing to hunt over these areas during the construction phase.

97. The proportion of potential goshawk foraging habitat which is expected to be lost would be even less when considered in the context of the goshawks' core home range, approximately 2,827ha as detailed above. Within this wider area there is considered to be an abundance of alternative and equally suitable foraging habitat. Therefore, the direct loss of potential goshawk foraging habitat during construction is predicted to have an effect of Negligible magnitude on the local goshawk population and hence the level of effect significance is also predicted to be **Negligible**.

8.6.5.1.2 Disturbance and Displacement

Nest Sites

98. As mentioned above, the two goshawk nest sites recorded during surveys to inform this assessment were over 1km from the nearest turbine location, while the minimum distance for historic nest sites provided during the desk study was 500-600m away from the nearest turbine.

99. A survey of expert opinion identified that goshawks in Europe have a reasonably high level of tolerance to human disturbance and human-altered landscapes (Ruddock and Whitfield, 2007). Evidence suggested that disturbance during the breeding season was found to elicit responses ranging from static (e.g. alarm calling) to active (e.g. taking flight) up to 750m from a nest and that nest abandonment was likely to occur when the disturbance source was within 100m of a nest site. Disturbance free zones of 400m during the nest building and incubation period, reduced to 200m once the young are at least 10 days old, have been advocated in several studies, although a disturbance free zone of 300-500m is a more widely accepted precautionary range.

100. Based on these disturbance distances, most types of construction activity to facilitate the Proposed Development e.g. use of heavy plant around the turbine locations, are anticipated to be at a distance which would not result in any substantial adverse effects to goshawk regarding disturbance and displacement.

101. However, two aspects of the construction activities require further consideration. Blasting to open up borrow pits may be required to facilitate the Proposed Development, this activity has the potential to generate the largest amount of noise disturbance albeit over a short duration. The closest borrow pit location to one of the goshawk nest sites was approximately 1.1km, while the second nest site was approximately 2km from the nearest borrow pit location.

102. Although there is an absence of information on goshawk disturbance reactions to blasting activities, Ruddock and Whitfield (2007) cite a study on North American prairie falcons as a suitable model species for peregrine falcon (as information was also not available for this species). The study (Holthuijzen *et al*. 1990) experimentally examined the influence of blasting regimes at mines on nesting prairie falcons, testing tolerance of up to 140dB, and in response to some blasts found initiation of flight, cessation of incubation and brooding, for a short period (average recorded return time to the nest was 1.4 minutes after a blast). There were no observable effects from blasts in the range of 560 to 1000m.

103. Although goshawk and the two falcon species discussed above have differing habitat requirements for the siting of nests, goshawk would be anticipated to be less affected by blasting noise (at the ranges discussed above) due its choice of nest site location in coniferous forestry which would act as a natural sound attenuation barrier for the sound waves. The two falcon species nest on open cliff habitats where there is likely to be less barrier between the nest site and the blasting location (not withstanding some situations where a nest site could be located on the blindside of a hill relative to the blasting location). Taking account of the distance of the closest goshawk nest to a borrow pit location and a study on behaviour to blasting for another raptor species, there are not anticipated to be any substantial adverse effects from blasting activities and the level of effect is predicted to be **Negligible**.

104. A second aspect of the construction activities to facilitate the Proposed Development which requires further consideration is the upgrading of the operational Harestanes Windfarm track network which would include a section of track located approximately 140m from one of the goshawk nest sites identified during surveys to inform this assessment.

105. The works associated with the track upgrade are anticipated to be of a short-term, temporary nature and occupy a relatively small, linear footprint. However, given the relative proximity of the works in this area to the nest site, if these were to be undertaken in the breeding season then there could be resulting disturbance to breeding adult goshawks and their young, taking account of the disturbance distances discussed above.

106. There are reported instances however, where goshawks have successfully nested within 20m of active and publicly used forestry tracks and within 250m from a busy A-class road (Fauch Hill Sustainable Energy Ltd., 2012). Similarly, a pair of goshawks successfully reared a chick during the construction of the operational Harestanes Windfarm while controlled and monitored vehicle movements took place approximately 190m from the active nest during the latter stages of the breeding season (RPS, 2014).

107. Nonetheless, given the proximity of the known goshawk nest site to the Proposed Development footprint, it is highly likely that if works were programmed to take place in this part of the site during the breeding season that birds engaged in a nesting attempt would be disturbed. Should the disturbance be particularly intensive or prolonged this could possibly lead to abandonment of the nest and failure for that year. However, even taking this as the worst-case scenario, the effect of this on the local goshawk population is expected to be temporary and of short-term duration, most likely only affecting breeding in a single year.

108. Therefore, the effect of potential disturbance of nesting goshawks during construction is predicted to have a Small effect on the local goshawk population which, given the regional (medium) importance of the species, is predicted to result in an adverse effect of **Slight** significance (which is not significant in terms of the EIA Regulations).

109. Alternatively, if works commence prior to and continue into the breeding season at this location, even though it is likely that the resident goshawk pair would be discouraged and displaced from using their established nest site, it is anticipated that they would be able to establish a new nest site in the wider surrounding woodland. Indeed, there is expected to be an availability of suitable alternative nesting trees to which the birds may be displaced e.g. the Whitefaulds Hill pair used four different nest site locations within 350m of each other between 2014-2019. The pair may then go on to have a successful breeding attempt in that year. Under this scenario, the effect of potential displacement is predicted to have a Negligible effect on the local goshawk population resulting in an effect of **Negligible** significance. Such displacement is thought to be regularly experienced by goshawks occurring in commercial coniferous plantations as traditional nesting coupes mature and are harvested; moderate timber harvesting appears to have no effect on goshawk population levels as long as cover reduction does not exceed about 30% (Penteriani and Faivre,2001, in Rutz *et a*l, 2006).

110. If the works are programmed to take place outside of the breeding season, then any effects described above would be avoided (**No Effect**).

Foraging Habitat

111. As discussed above, permanent habitat loss through construction of windfarm infrastructure would involve a small footprint in comparison to goshawk foraging habitat in the wider area and would comprise mostly linear features. It is also expected that only certain parts of the Site would be under active construction at any one time. Furthermore, goshawks are unlikely to be as sensitive to disturbance in their foraging grounds as they are close to their nest sites. Consequently, it is likely that the resident goshawks' would continue to be able to forage over much of their traditional foraging grounds throughout the construction phase. Even if they are discouraged from some areas while works are ongoing, there is an abundance of alternative and equally suitable foraging habitat in the wider surrounding area which is expected to be within the local goshawks' core range.

112. Therefore, the potential disturbance of goshawks from their foraging habitat during construction is predicted to have an effect of Negligible magnitude on the local goshawk population and the any effect is predicted to be of **Negligible** significance.

8.6.5.2 Operation

8.6.5.2.1 Disturbance and Displacement

Nest Sites

113. As discussed above, the two goshawk nest sites identified during surveys to inform this assessment were over 1km from the nearest turbine location while details provided of historic nest sites showed the closest nest site locations to be between 500-600m from the nearest turbine location. Maintenance works activity along access tracks would be at a far lower level than for the construction phase, therefore the potential adverse effect identified from upgrade works to access tracks in that phase does not apply here. Vehicular movements are expected to be relatively infrequent and only cause discrete, localised disturbance for very short durations; vehicle activity is expected to be on a comparable scale or less to that already experienced by goshawk through other activities in the area, e.g. forestry works and management activities within the operational Harestanes Windfarm site. Furthermore, the location of historic nest sites (Whitefauld Hill area) in proximity to the operational Harestanes Windfarm and a new nest site recorded within the operational Harestanes Windfarm in 2020 indicate that goshawks are tolerant of these types of activity. The potential disturbance of goshawks from their nest sites during operation is predicted to have an effect of Negligible magnitude on the local goshawk population and the effect is predicted to be of **Negligible** significance.

Foraging Habitat

114. It is expected that in the short to medium-term (10-15 years) following the construction of the Proposed Development it would continue to be surrounded by semi-mature to mature coniferous plantation forestry; the type of habitat which goshawks are likely to hunt over and amongst. Even in the longer term, once these areas have been felled in line with the Forest Design Plan, the clear-felled and presumably restocked coupes are still likely to represent potential goshawk foraging habitat.

115. Unlike during the construction phase, when goshawks are anticipated to be relatively undeterred from continuing to hunt across the Proposed Development footprint, they are likely to be deterred from flying near the rotating turbine blades during operation of the proposed windfarm. Although there is no specific study available in relation to goshawk, a study of various species (Pearce-Higgins *et al*, 2009) with regards displacement from operating wind turbines and associated infrastructure, included two raptor species, buzzard and hen harrier. Flight activity for these

species was noted to be reduced by 41% and 53% respectively within 500m of wind turbines. It is reasonable to assume that goshawks would at least be deterred from flying within the rotor swept area around the turbine towers (i.e. a radius of 75m). This would effectively render an area of approximately 1.7ha of habitat/airspace unavailable to goshawks to hunt over per turbine: a total of approximately 14ha across the entire proposed windfarm. In addition, goshawks are likely to maintain a stand-off distance from the rotating blades. No literature was found on displacement of goshawks by operating windfarms specifically. However, as a worst-case scenario, based on the 300-500m disturbance limit for nesting goshawks (Ruddock and Whitfield, 2007), it is possible that foraging birds may avoid the turbines within this disturbance range.

116. Taking the area encompassing the 75m rotor swept area around the eight turbines, plus the upper limit of the potential disturbance ranges indicated for nesting goshawk (a 500m buffer), this would result in the effective loss of approximately 600ha of potential foraging habitat through displacement (accounting for inter-turbine radial zone overlap). Based on the species' 3km core home range (approximately 2,827ha), this would correspond to the effective loss of approximately 21% of the available goshawk foraging habitat at the Site, and approximately 2% from the species' wider 10km foraging range (i.e. 31,415ha).

117. As explained above, goshawks are known to be relatively tolerant of human disturbance and human-modified landscapes (Ruddock and Whitfield, 2007). Indeed, resident goshawks associated with the operational Harestanes Windfarm have been observed passing through the turbine array and within approximately 200m of the turbines (RPS, 2014). It is more likely therefore, that goshawks would continue to forage within the lower end (300m) disturbance range from the operating turbines and the effective habitat loss through displacement is predicted to be closer to 200m. This would correspond to the effective loss of 192ha of potential foraging habitat representing 7% of the species' 3km core home range (approximately 2,827ha), and just 0.6 % from the species wider 10km foraging range (i.e. 31,415ha).

118. Consequently, the effect of displacement on the resident goshawks by the operation of the Proposed Development is anticipated to be of no more than Small magnitude which, given the regional (medium) importance of the species, is predicted to result in an effect of no more than a **Slight** significance.

8.6.5.2.2 Collision with Turbines

119. Goshawks spend much of their time flying beneath the canopy with prolonged flight activity above the canopy mainly occurring during the territorial display period in early spring and during juvenile dispersal in late summer/early autumn. This corresponds to the peaks in the frequency of flight activity detected during Flight Activity Surveys with almost 60% of all observed goshawk flights being recorded during these periods (see **Appendix 8.2 Ornithological Confidential Appendix**). Due to this flight behaviour it is recognised that vantage point surveys are unlikely to detect and adequately represent the true levels of goshawk flight activity at a site (SNH, 2017). Therefore, the proportion of flight activity recorded at collision height is likely to be an overestimation compared to overall flying time by the species, although this is unlikely to affect estimates of collision risk because the total amount of estimated flight time at potential collision height is unaffected.

120. Based on the observed flight activity, the collision risk model estimates 0.3 goshawk collisions every year, as calculated using the recommended 98% avoidance rate for this species (SNH, 2018). This equates to one goshawk mortality approximately every three years and approximately eight mortalities over the 25-year operational life span of the Proposed Development.

121. At the regional (Dumfries and Galloway) level the predicted collision rate would represent the loss of approximately 2% (1.5%-2%) of the estimated breeding population every three years based on an estimated 22-32 pairs (44-64 individuals).

122. With regards to how this compares to natural mortality rates, Kenward (2006) reviewed several population studies from Scandinavia, Europe and North America and found background mortality rates to be 15%-21% in adults, 31%-35% in second year birds and 40% - 42% in juveniles. The estimated Dumfries and Galloway breeding population of between 26 and 32 pairs (52-64 individuals) would therefore be expected to have a natural adult mortality rate of between nine and 11 birds per year (based on an average adult mortality rate of 18%). This equates to between 14 and 18 deaths through natural mortality over the same period that it is predicted that one mortality would occur through collision with the wind turbines at the proposed windfarm (i.e. every 18 months to two years). Assuming most collisions at the proposed windfarm would be of breeding adults based on the presence of two goshawk territories within the wider area, this equates to an increase of between 0.2% and 0.3% of the natural adult mortality rate.

123. Based on the above, it is considered that the number of goshawk mortalities caused through collisions with the wind turbines of the Proposed Development would represent a small proportion of the population at a regional (Dumfries and Galloway) scale, compared to the background mortality rates. Any effects on the population are therefore predicted at most to be of Small magnitude and to have an adverse effect of **Slight** significance, considering the regional (medium) importance of the goshawk population.

8.6.5.2.3 Barrier Effects

124. Forest of Ae, within which the Proposed Development lies, is part of a much larger interconnected band of commercial forestry which extends approximately 30km to the north east, including Castle O'er Forest, Eskdalemuir Forest and Craik Forest. This forestry is largely surrounded by agricultural land and open moorland which is likely to represent foraging habitat for locally occurring goshawks as well.

125. The Proposed Development is a relatively small extension of operational Harestanes Windfarm to the north which, in combination with the adjacent Minnygap Windfarm, potentially forms a barrier to goshawk flight activity extending for approximately 10km (i.e. the upper extent of their core range (SNH, 2016)). Although relatively small, the Proposed Development footprint potentially increases this barrier effect by cutting off flight routes around the southern edge of the Forest of Ae which goshawks could currently use to avoid operational wind turbines.

126. At worst, the resident birds may have to fly over or around the proposed turbines in order to access some areas of potentially suitable habitat on the opposite side of the Site, possibly resulting in slightly higher energy expenditure. However, unlike species such as geese, most raptors including goshawks do not undertake direct and predictable daily commuting flights between nesting or roosting sites and traditional foraging grounds. Furthermore, goshawks have been observed flying through constructed windfarms as discussed above and have a reasonably high level of tolerance to human disturbance and human-altered landscapes (Ruddock and Whitfield, 2007). Consequently, the presence of the proposed wind turbines may not deter goshawks from accessing parts of their wider territory at all.

127. Any barrier effect that the Proposed Development may have on the movement of locally occurring goshawks is anticipated to be of no more than Small magnitude which, given the regional (medium) importance of the species, would result in an adverse effect of **Slight** significance.

8.7 Mitigation

128. Whilst the above impact assessment does not predict any effects of greater level than slight significance (i.e. not significant) to goshawk, some mitigation measures are recommended as good practice to minimise any construction, operational or decommissioning effects on this species. These measures are discussed below.

8.7.1 Pre-Construction

129. Prior to the commencement of felling and construction works, pre-construction raptor/goshawk surveys of the Application Boundary and a surrounding buffer of at least 1 km would be carried out. The surveys would broadly follow the methods detailed in Hardey *et al*. (2013) and would involve a combination of vantage point surveys followed by more intensive forest checks to identify active nest site locations.

130. The vantage point surveys would include the late winter/early spring months when goshawks engage in display flight activity and observations at this time may help to target certain areas during the forest searches. A detailed survey protocol would be prepared and agreed with NatureScot prior to the commencement of surveys to ensure appropriate intensity and coverage by the survey.

131. The survey programme should be undertaken in the breeding season immediately preceding the commencement of construction works. For example, if construction works were programmed to commence in the autumn, surveys should be undertaken in the preceding breeding season of that year. The purpose of these surveys would be to

confirm the continued presence of goshawks (and identify the presence of any other specially protected raptor species) in the vicinity of the Proposed Development, and establish whether any breeding pairs are present and where the current nest sites are located (i.e. in relation to the Proposed Development).

132. The surveys would be supplemented by consultation with Dumfries and Galloway Raptor Study Group and FLS who may hold information on goshawk (or other raptor) nesting activity which may have taken place in the intervening years between the submission of this EIA Report and the commencement of construction works.

133. These surveys would identify whether there are any other nest sites in the vicinity of the windfarm site which could pose a constraint to the construction works and help to inform the scheduling of works.

8.7.2 Construction

134. The pre-construction goshawk surveys would be repeated during the construction phase in order to identify the requirement for any associated works exclusion zones and assist the contractor to schedule the works more appropriately to avoid disturbance impacts on nesting goshawks.

135. Site clearance and construction activities should be timed to take place outside the main bird breeding season, where possible, to avoid nest destruction and disturbance to all nesting birds, as detailed in **Section 8.6.4**. With regards to goshawk specifically, young recently fledged birds may still be present around the nest into August and the presence and potential disturbance of these dependent young must be taken into consideration given the species Schedule 1 protection status.

136. SNH (2016b) recognises that avoiding construction work within the breeding season for birds may not be possible, as the season coincides with the best weather for construction and recommends precautionary measures would to be taken in relation to breeding birds. For instance, if works would coincide with the breeding season it is considered advantageous to start before mid-March. This would allow birds the opportunity to take potential disturbance into account in the process of selecting a nest site. Goshawks often have widely spaced, alternative nest sites within their home range (Forrester *et al*, 2007) and the data discussed here indicates that is the case for pairs relevant to the Proposed Development footprint. Those birds with a choice of nest sites may select an alternative area where disturbance is less intrusive in which to nest for that season.

137. During the breeding season, pre-works nest checks of felling areas would be undertaken for goshawk, as for all birds, using the approach outlined in **Section 8.6.4**. The nest checks and any subsequent buffer zones would take account of disturbance distances discussed for goshawk in **Section 8.6.5.1.2** if goshawk nests are located.

8.7.3 Operation

138. As no significant adverse effects are predicted during the operational phase of the Proposed Development no mitigation or post-construction monitoring is proposed.

8.8 Residual Effects

139. Even in the absence of mitigation it is predicted that the construction and operation of the Proposed Development would result in short- and long-term adverse effects of no more than a slight significance (i.e. not significant) on the relevant regional (Dumfries and Galloway) and NHZ goshawk population. **Table 8.11** details residual effects for goshawk following the implementation of the mitigation measures detailed above, which are predicted to result in slightly fewer adverse effects of no more than a slight significance (i.e. not significant).

Description of Effect	Pre-mitigation Effect		Mitigation Measure	Residual Effect	
	Magnitude	Significance		Magnitude	Significance
During Construction					
Habitat loss (nesting)	None	None	None	None	None
Habitat loss (foraging)	Negligible	Negligible (not significant)	None	Negligible	Negligible (not significant)
Disturbance/Displacement (nesting)	Small	**Slight** (not significant)	Surveys prior and during construction identify active nests and inform requirement for work exclusion zones.	Negligible	Negligible (not significant)
Disturbance/Displacement (foraging)	Negligible	Negligible (not significant)	None	Negligible	Negligible (not significant)
During Operation					
Disturbance/Displacement (nesting)	Negligible	Negligible (not significant)	Post-construction surveys to identify goshawk distribution, nest locations and breeding success	Negligible	Negligible (not significant)
Disturbance/ Displacement (foraging)	Small	**Slight** (not significant)	None	Small	**Slight** (not significant)
Barrier Effect	Small	**Slight** (not significant)	None	Small	**Slight** (not significant)

Table 8.11. Predicted Residual Effects to Goshawk

8.9 Cumulative Assessment

8.9.1 Background Information

140. The above sections have considered the implications of the Proposed Development on VORs in isolation from potential effects of other projects and activities. However, the EIA Regulations also require the potential for cumulative effects to be assessed.

141. According to the relevant SNH guidance (SNH, 2018a), an assessment of cumulative effects associated with a specific development proposal should encompass the effects of the proposal in combination with:

- Developments that are already operational, and those that are consented, and likely to be built should be considered first as the impacts arising from these (once mitigation has been factored in) are unavoidable;
- Applications that have been formally submitted to a planning authority or Scottish Government but have yet to be determined, consented and built developments applications should then be factored in. Confidential data (e.g. on Schedule I species) from such assessments would not necessarily be in the public domain.

142. For windfarms which do not influence designated sites, SNH (2018b) guidance highlights the relevance of the NHZ as the basis for the geographical range in the identification of cumulative effects. With regards to goshawk, it has been considered that the most relevant geographic scale at which to assess impacts on the species is the Dumfries and Galloway population which effectively covers the same area as the relevant NHZ (NHZ 19, Western Southern Uplands & Inner Solway). However, it is considered that the collection of information on all development projects

across this large area is out of proportion to the scale of the Proposed Development. Instead, the following cumulative impact assessment on goshawk has considered the effects of all other developments within 10km of the Proposed Development; 10km being the species' typical maximum foraging range (SNH, 2016).

143. Based on this range of assessment of 10km, the following three windfarm sites have been scoped into this cumulative impact assessment:

- operational Harestanes Windfarm;
- Minnygap Windfarm; and
- Dalswinton Windfarm.

144. **Table 8.12** below details goshawk observations from the three windfarms.

Windfarm	Details of Recorded Goshawk Activity
operational Harestanes Windfarm	Goshawk bred on the periphery of the site but there were no records from flight activity surveys (zero flights at collision risk)
Minnygap Windfarm	No mention in ES of goshawk
Dalswinton Windfarm	No mention in ES of goshawk

Table 8.12 Goshawk Records from Within 10km of the Proposed Development

8.9.2 Assessment of Cumulative Effects to Goshawk

8.9.2.1 Habitat Loss

145. A goshawk territory was only recorded at one of the three sites (operational Harestanes Windfarm) and this was on the periphery of the site. Therefore, there is not predicted to be any cumulative loss of goshawk nesting sites.

146. With regards to foraging habitat, the Proposed Development is an extension of the one site where goshawk was recorded in the relevant search area; operational Harestanes Windfarm. The Proposed Development increases the potential area of foraging habitat loss. However, the combined footprints of these two developments and the proportion of habitat which would be lost as a result is expected to be negligible in comparison to the area of habitat which would be retained within the wider development sites. The area of potential foraging habitat lost would be even less when considered in relation to the available foraging habitat surrounding each site. Consequently, any cumulative loss of goshawk foraging habitat is **Negligible**.

8.9.2.2 Disturbance/Displacement

147. Based on the data available, the only goshawk territories potentially affected by disturbance/ displacement are two territories within the overlapping survey areas for operational Harestanes Windfarm and the Proposed Development, with Minnygap Windfarm also potentially having an influence on the movements of birds from these territories due to its proximity to the other two sites. As discussed in relation to the Proposed Development on its own, goshawks are anticipated to habituate to the presence of turbines to some extent, they are known to be relatively tolerant of human-modified landscapes and resident goshawks associated with the operational Harestanes Windfarm have been observed flying through the site within approximately 200m of the turbines.

148. Furthermore, it is expected that the relatively small-scale displacement from potential foraging habitat which may occur at each site would be balanced by the availability of suitable alternative foraging habitat in the areas surrounding those developments. As such, at most the cumulative effect is predicted to be of **Slight** significance, which is not significant in terms of the EIA Regulations.

8.9.2.3 Cumulative Collision Mortality

149. Given the lack of at-risk flights or the absence of goshawk from windfarm sites within 10km of the Proposed Development, there are no cumulative effects identified for goshawk from collision risk. Therefore, any cumulative effect is predicted to be **Negligible**.

8.9.2.4 Cumulative Barrier Effects

150. As discussed in relation to the Proposed Development on its own, raptors such as goshawks do not undertake direct and predictable commuting flights between nesting or roosting sites and traditional foraging grounds, unlike species such as geese. Therefore, any cumulative barrier effects which may occur as a result of multiple developments are expected to be relatively localised and restricted to the developments where goshawks are known to occur and those in the immediately surrounding area.

151. Any cumulative barrier effect that the Proposed Development may have on the movement of locally occurring goshawks in combination with windfarms in the immediately surrounding area, is anticipated to be of no more than Small magnitude. Given the regional (medium) importance of the species, this is predicted to result in a cumulative effect of **Slight** significance which is not significant in terms of the EIA Regulations.

8.10 Summary

152. The baseline surveys conducted to inform the EIA Report have identified an ornithological assemblage associated with the Proposed Development and surrounding area that is typical of the coniferous plantation forestry and open moorland habitats of Central/Southern Scotland, with usage within the Site being confined mainly to relatively common breeding passerines and woodland raptors. Although several bird species were identified as being of conservation concern, most were not considered to be present in significant numbers compared to their respective regional or national populations. For many species their distribution was outwith the Site (e.g. the very small number of wader territories recorded), and the coniferous forestry comprising the habitat within the Site was not suitable for such species. Therefore, further consideration of these species was not required within the EIA Report. Following an assessment of the distribution, abundance and frequency of occurrence of all target species recorded the desk study and during the programme of ornithological surveys, one VOR was scoped into the impact assessment: goshawk.

153. The Site does not overlap with any statutory or non-statutory designated sites of ornithological interest. The Site is located approximately 9.5km northwest of Castle Loch, Lochmaben SPA/Ramsar site designated for non-breeding populations of pink-footed goose and 17.5km north of the Upper Solway Flats and Marshes SPA/Ramsar designated for non-breeding populations of waterfowl, notably pink-footed goose. There was however, no evidence of connectivity with pink-footed goose populations associated with the two SPAs, due to this distance of these populations from the Site and the known movements of these populations through studies. Consequently, Castle Loch, Lochmaben SPA/Ramsar site and Upper Solway Flats and Marshes SPA/Ramsar site were scoped out of the assessment, as agreed by NatureScot and RSPB.

154. With regard to goshawk, the impact assessment identified that construction of the Proposed Development would not result in the loss of any known nesting sites and that the loss of foraging habitat would be negligible. Similarly, disturbance from nesting and foraging areas is predicted to be negligible, incorporating mitigation in the form of best practice in relation to breeding birds to minimise disturbance of nest sites near the works.

155. During operation the effective loss of potential foraging habitat through the displacement of goshawks from areas around each turbine was considered to have an adverse effect of slight significance on the resident goshawk population. This was balanced by the availability of suitable alternative habitat in the wider surrounding area which is expected to be within the resident birds' territories. The operational turbines are also anticipated to discourage birds from flying through the windfarm in order to access potential foraging areas on the opposite side. However, the effect of this partial barrier effect on the resident goshawks is considered to be slight, given that birds are anticipated to become habituated and fly though the operational windfarm.

156. With regards to collision risk, the predicted collision rate of 0.3 birds per year (or one bird every three years) and up to eight birds over the course of the Proposed Development's life span. Compared against natural mortality rates for the species and when considering that goshawks are generally at low vulnerability to collisions with wind turbines it is concluded that any effects of collision mortality on goshawks are expected to be no more than slight.

157. Mitigation measures are proposed to minimise the effects of disturbance on birds, and particularly goshawks, during the construction phase. As no significant adverse effects are predicted during the operational phase of the Proposed Development no mitigation or post-construction monitoring is proposed. The findings of the post-construction monitoring would be used to determine if effects are as predicted or if effects are more significant than predicted, resulting in a requirement for further adaptive management to ameliorate these effects.

158. With regard to cumulative effects of the Proposed Development in combination with those of other windfarm developments it is concluded that while cumulative effects of habitat loss, disturbance, displacement, barrier effect and collision mortality may well occur, the significance of those effects on goshawks would remain no more than slight.

8.11 References

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