

Harestanes West Windfarm

Environmental Impact Assessment
Report

Volume 2

Chapter 9: Ornithology

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Technical Appendix 9.1: Ornithological Technical Report

Technical Appendix 9.2: Confidential Ornithological Information

Technical Appendix 9.3: Collision Risk Modelling Report

Abbreviations

BoCC	Birds of Conservation Concern
CA	Confidential Appendix
CIEEM	Chartered Institute of Ecology and Environmental Management
CRM	Collison Risk Monitoring
D&GRSG	Dumfries and Galloway Raptor Study Group
DGC	Dumfries and Galloway Council
DS	Desk Study
EIA	Environmental Impact Assessment
EcIA	Ecological Impact Assessment
FAS	Flight Activity Survey
FLS	Forestry and Land Scotland
HRA	Habitat Regulations Appraisal
IOF	Important Ornithological Feature
IPCC	Intergovernmental Panel on Climate Change
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LBGS	Lekking Black Grouse Survey
LNR	Local Nature Reserve
MAGIC	Multi-Agency Geographic Information for the Countryside
MBBS	Moorland Breeding Bird Survey
NHZ	Natural Heritage Zones
NNR	National Nature eReserve
NPF	National Planning Framework



RBBP	Rare Breeding Birds Panel
RSPB	Royal Society for the Protection of Birds
SBL	Scottish Biodiversity List
SBRS	Scarce Breeding Raptor Survey
SBS	Scottish Biodiversity Strategy
SOC	Scottish Ornithologists' Club
SPA	Special Protection Area
SQE	Suitably Qualified Ecologist
SSGEP	South Scotland Golden Eagle Project
SSSI	Site of Special Scientific Interest
SWSEIC	South West Scotland Environmental Information Centre
TA	Technical Appendix
UNESCO	United Nations Educational, Scientific and Cultural Organization
VP	Vantage Point

9. Ornithology

9.1. Executive Summary

1. Harestanes West Windfarm (hereafter 'the proposed Development') comprises up to 12 wind turbines, six with a maximum tip height of 220 metres (m) and six with a maximum tip height of 200 m, with associated ancillary infrastructure.
2. The baseline surveys conducted to inform this Environmental Impact Assessment (EIA) Report Chapter 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 Southern Scotland.
3. The proposed Development falls almost entirely within the Forest of Ae (with the exception of around 500 m of the access track which runs through agricultural land adjacent to the A701), a commercial plantation largely comprised of non-native species such as Sitka spruce. The wider area is dominated by open moorland habitats, farmland and other forest blocks.
4. The area within the Application Boundary, hereafter referred to as 'the Site' does not overlap with any statutory or non-statutory designated sites of ornithological interest. The Site is located approximately 13 km northwest of Castle Loch, Lochmaben Special Protection Area (SPA)/Ramsar Site designated for non-breeding populations of pink-footed goose (*Anser brachyrhynchus*) and 17.2 km north of the Upper Solway Flats and Marshes SPA/Ramsar Sites designated for non-breeding populations of waterfowl, most notably pink-footed goose. There was, however, no evidence of connectivity with pink-footed goose populations associated with the two SPAs (Castle Loch has not been used by pink-footed geese for over a decade). Although pink-footed geese were recorded during the baseline surveys, flight activity was limited to the passage period and involved birds on migration (most at high altitude), rather than frequent foraging flights over the Site during the winter period and therefore could be linked with any designated site to the south of the Site. Studies have identified that the distribution of this species is largely concentrated within farmland habitats within the Nith and Ae valleys to the south of the Site over the winter period. Consequently, Castle Loch, Lochmaben SPA/Ramsar Site and Upper Solway Flats and Marshes SPA/Ramsar Site were scoped out of the assessment. Although several bird species of conservation concern were recorded during the baseline surveys, most were not present in significant numbers with respect to their regional or national populations, and/or were distributed outside of the Site. As expected, usage of the Site was mainly confined to relatively common breeding passerine species of upland plantation forest and woodland raptors such as goshawk (*Accipiter gentilis*). Although "open ground" species were recorded during the baseline surveys, these were restricted to areas outside of the proposed Development to the north and south. Therefore, further consideration of these species was not required within the EIA Report.
5. Following an assessment of the distribution, abundance and frequency of occurrence of all target species recorded by the desk study and during the programme of ornithological surveys, one Important Ornithological Feature (IOF) was scoped into the impact assessment: goshawk.



6. The impact assessment identified that the 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 of 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 or roost sites near the works.
7. During operation the effective loss of potential foraging habitat through the displacement of goshawk from areas around each turbine was considered to have a minor adverse effect on the resident goshawk population that is considered to be '**Not Significant**'. 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 may discourage birds from flying through the array in order to access potential foraging areas on the opposite side, although this is considered unlikely given that birds are anticipated to become habituated and fly through the operational windfarm. The species also generally hunts under the tree canopy and therefore below collision risk height, and therefore may not be displaced from habitat around the turbine. As a result, although there may be a minor adverse effect as a result of potential foraging habitat loss, any effects are considered to be '**Not Significant**'.
8. With regards to collision risk, the predicted collision rate was calculated as 0.391 birds per year (or one bird every 2.5 years) and 15-16 birds over the course of the proposed Development's life span of 40 years (this was based on adding the non-breeding and breeding season for when the greatest flight activity was recorded). Compared against natural mortality rates for the species it is concluded that any effects of collision mortality on goshawks are expected to be no more than minor adverse, and therefore '**Not Significant**'.
9. Mitigation measures are proposed to negate the effects of disturbance on goshawks and other bird species during the construction phase. Although the adverse effects during the operational phase are predicted to be '**Not Significant**', post-construction monitoring is still proposed in order to validate the conclusions of the assessment.
10. With regard to cumulative effects of the proposed Development with those of other developments it is concluded that while cumulative effects of habitat loss, disturbance, displacement, barrier effect and collision mortality may occur, those effects remain no more than minor adverse on the goshawk population and ultimately '**Not Significant**'.

9.2. Introduction

9.2.1. Overview

11. This Chapter of the Harestanes West Windfarm EIA Report describes and evaluates the baseline ornithological interests of the Site and surrounding area. Together with **Chapter 8: Ecology & Biodiversity**, this chapter completes the assessment of effects from the proposed Development on ecology and biodiversity.
12. The assessment uses data collated from a commissioned programme of ornithology surveys undertaken by WSP over a 24-month period between September 2019 and August 2021. 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.



13. The data has been collected within the last 5 years and is considered reliable against NatureScot guidance¹ as the current populations of key species are not known to be changing rapidly within the region.
14. This Chapter should be read in conjunction with **Technical Appendix 9.1: Ornithological Technical Report** of the EIA Report. Sensitive records such as nest and display sites of rare and vulnerable species of conservation concern are presented in **Technical Appendix 9.2: Confidential Ornithological Information**, the distribution of which is restricted to the immediate Project Team, NatureScot, the Royal Society for the Protection of Birds (RSPB) and the Planning Authority. The collision risk assessment is detailed within **Technical Appendix 9.3: Collision Risk Modelling Report**.
15. This Chapter should be read with reference to the following figures, presented in **Volume 3A** of this EIA Report:
 - **Figure 9.1 – Vantage Point Locations and Viewsheds;**
 - **Figure 9.2 – Targeted Bird Survey Areas;**
 - **Figure 9.3 – Ornithological Designated Sites within 20 km;**
 - **Figure 9.4a – Flight Activity Survey Results: Raptors (Year 1: 2019/20);**
 - **Figure 9.4b – Flight Activity Survey Results: Raptors (Year 2: 2020/21);**
 - **Figure 9.5a – Flight Activity Survey Results: Waterfowl and Wading Birds (Year 1: 2019/20);**
 - **Figure 9.5b – Flight Activity Survey Results: Waterfowl and Wading Birds (Year 2: 2020/21);**
 - **Figure 9.6a – Scarce Breeding Raptor Survey Results (Year 1: 2020);**
 - **Figure 9.6b – Scarce Breeding Raptor Survey Results (Year 2: 2021);**
 - **Figure 9.7a – Breeding Bird Survey Results: Wader Territories (Year 1: 2020);**
 - **Figure 9.7b – Breeding Bird Survey Results: Wader Territories (Year 2: 2021);**
 - **Figure CA9.1 – Desk Study Records of Scarce Raptor Nest Sites;**
 - **Figure CA9.2 – Desk Study Records of Scarce Black Grouse Lek Sites;**
 - **Figure CA9.3 – Black Grouse Lek sites (Year 1: 2020 and Year 2: 2021);**
 - **Figure CA9.4 – Scarce Breeding Bird Survey Results (Year 1: 2020);**
 - **Figure CA9.5 – Scarce Breeding Bird Survey Results (Year 2: 2021);**
 - **Figure CA9.6 – Overall Distribution of Tracked Golden Eagle Movements Within 10 km of Site;**
 - **Figure CA9.7 – Golden Eagle Roost Distribution;**
 - **Figure CA9.8 – Golden Eagle Occurrence Hotspots;**

¹ *Scottish Natural Heritage (2017) Recommended bird survey methods to inform impact assessment of onshore wind farms.*



- Figure CA9.9 – Golden Eagle Roost Hotspots; and
- Figure CA9.10 – Golden Eagle Flight Distribution.

9.3. Legislation and Policy Context

16. In the preparation of this Chapter, reference has been made to the following key legislation, policy and guidance.

9.3.1. International Legislation

9.3.1.1. The Habitats Directive

17. 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 led to the establishment of European sites (including SPAs) and setting out how they should be protected.

9.3.1.2. The Birds Directive

18. 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 SPAs for species featured in 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 9.3.2.1.**

9.3.2. National Legislation

9.3.2.1. The Habitats Regulations

19. 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. However, for the consideration of Section 36 of the Electricity Act applications, The Conservation of Habitats and Species Regulations 2017 (which are ostensibly for England and Wales) also apply in Scotland.

9.3.2.2. The Wildlife and Countryside Act 1981 (as amended)

20. The act makes it an offence to 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.
21. In Scotland, for any wild bird species listed on Schedule 1A, it's an offence to intentionally or recklessly harass any such bird. For any wild bird species listed on Schedule A1, it's an offence to intentionally or recklessly take, damage, destroy or interfere at any time with a nest habitually used by any such bird.

9.3.2.3. Electricity Works (Environmental Impact Assessment (Scotland) Regulations 2017 (EIA Regulations)

22. The regulations were amended by The Environmental Impact Assessment (Miscellaneous Amendments) (Scotland) Regulations 2017, which applies to all applications for Section 36 consent in Scottish waters out to 200 nautical miles; and specify that the construction of certain developments will require an EIA.

9.3.3. Planning Policy

9.3.3.1. National Planning Framework 4

23. Scotland's fourth National Planning Framework (NPF4) (Scottish Government, 2023a) replaces the previous National Planning Framework 3 (NPF3) and Scottish Planning Policy (2014). It sets out new requirements for development, and in particular to ensure that positive effects are achieved for biodiversity. Development proposals for national, major or Environmental Impact Assessment (EIA) development will only be supported where it can be demonstrated that the proposal will conserve, restore and enhance biodiversity so they are in a demonstrably better state than without intervention.
24. NPF4 describes the role of the planning system in safeguarding statutory and non-statutory ecological sites of international, national and local importance and in protecting and enhancing degraded habitats and populations of priority species in order to safeguard these natural assets.

9.3.3.2. Scottish Biodiversity Strategy to 2045

25. Scottish Biodiversity Strategy (SBS) to 2045 (Scottish Government, 2023b) sets out an ambition for Scotland to be Nature Positive by 2030 and to have restored and regenerated biodiversity by 2045. This builds upon Scotland's pre-existing biodiversity guidance (Biodiversity: it's in your hands (Scottish Executive, 2004) and the 2020 Challenge for Scotland's biodiversity (Scottish Government, 2013), with reference to the Scottish biodiversity strategy post-2020 (Scottish Government, 2020a). The SBS is implemented locally through Local Biodiversity Action Plans (LBAP).

9.3.3.3. Dumfries and Galloway Local Biodiversity Action Plan (LBAP)

26. 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.

9.3.4. Guidance

27. The following guidance has been considered as part of this assessment:
- Planning Advice Note (PAN) 60 Planning for Natural Heritage 2000 (Scottish Government, 2020b);
 - 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 (NatureScot, 2017);
 - Assessing the Significance of Impacts from Onshore Wind Farms outwith Designated Sites (NatureScot, 2018a);
 - Assessing Connectivity with Special Protection Areas (SPAs) (NatureScot, 2016a); and
 - Assessing the Cumulative Impacts of Onshore Wind Farms on Birds (NatureScot, 2018b).



9.3.5. Consultation

28. To ensure a comprehensive understanding of the potential ornithological issues associated with the proposed Development to inform survey methodology and assessment, various stakeholders were contacted for information and comment as part of the pre-application Scoping exercise. **Table 9.1** details the consultees, their responses and any subsequent actions if relevant.



Table 9.1 Consultation Response

Consultee	Date	Response	Action
NatureScot	17.04.23	<p>At current stage Castle Loch, Lochmaben SPA and Ramsar site, Upper Solway Flats and Marshes SPA and Ramsar site cannot be scoped out from the assessment due to presence of Pink-footed geese.</p> <p>If no assessment is undertaken, EIA must indicate why there is not anticipated effect on this species.</p> <p>Similar clarification on whether wildfowl are to be scoped in/out is required.</p> <p>NatureScot is in agreement with principles outlined in paragraph 184. Until full ornithological assessment is received, the suitability of mitigation for ornithological interests cannot be decided at this stage.</p>	<p>All impacts on designated sites and their qualifying species are assessed within the ornithology chapter.</p> <p>An Outline Habitat Management Plan/Biodiversity Enhancement Plan will be included as part of the wider EIA Report as part of the EIA Report Chapter 8: Ecology & Biodiversity.</p>
	15.08.23	<p>Habitats Regulations Appraisal (HRA) will be required. It will need to assess geese, a qualifying interest for designated sites within 20 km of the Site. Connectivity of the Site to wildfowl that are also a qualifying interest is unlikely, but should be included in the HRA.</p>	<p>All impacts on designated sites and their qualifying species are assessed within the ornithology chapter.</p> <p>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 Technical Appendix 9.1 Ornithological Technical Report and Table 9.9) demonstrates that geese from these SPAs don't use habitats in proximity of the Site during the winter period (e.g. there is no functionally linked land in proximity to the Site) and the flight activity over the Site was minimal and restricted to the passage periods.</p> <p>It is considered that there is no prospect of a Likely Significant Effect and therefore HRA Screening is not required for the Proposed Development.</p>
RSPB	16.05.23	<p>RSPB agrees there is no connectivity between the proposed Development and the Castle Loch, Lochmaben SPA and Ramsar site and Upper Solway</p>	<p>RSPB data was received in January 2024 and will be presented within a confidential technical appendix to the ornithology chapter. A second data request was carried out in late July 2024 in order to obtain data to</p>



Consultee	Date	Response	Action
		<p>Flats and Marches SPA and Ramsar site and that these designations can be scoped out of the EIAR.</p> <p>RSPB agrees the range of completed surveys are sufficient and appropriate.</p> <p>It is recommended data from RSPB is sought by the applicant.</p> <p>RSPB does not believe further species or designated sites need to be considered in the assessment.</p> <p>RSPB agree with the species to be scoped out of the assessment.</p> <p>RSPB recommends all turbines are sited at least 750m from Black Grouse leks and a specific Breeding Bird Protection Plan is produced for Black Grouse to ensure lekking and breeding birds are not disturbed. Appropriate buffer distances and restrictions on construction activities during the lekking season should be included where applicable.</p> <p>RSPB is unable to find detail on proposals for biodiversity enhancement as part of the proposed development in light of the area for Black Grouse in Dumfries and Galloway. Further information ensuring the Black Grouse population is protected and enhanced is welcome. Wader populations in the same area could also be targeted for biodiversity enhancement works.</p> <p>In the recently adopted NPF4, Part (a) of Policy 3 (Biodiversity) requires that development proposals contribute to the enhancement of biodiversity, and where possible, integrate nature-based solutions. Any potential impacts, including cumulative impacts, on biodiversity, nature networks and the natural environment should be minimised through careful planning and design. Furthermore, part (b) of Policy 3 states where development requires an Environmental Impact Assessment, proposals should only be supported where it can be demonstrated the proposal will conserve, restore and enhance biodiversity so they are in a better state than without intervention.</p> <p>RSPB encourages the applicant to demonstrate how they will meet these requirements.</p>	<p>cover the entire access track route. This was provided in September 2024 and is incorporated into this chapter.</p> <p>An outline Breeding Bird Protection Plan is included within this chapter. This includes appropriate mitigation to ensure that sensitive features are protected from disturbance for example.</p> <p>Biodiversity enhancements for a range of species are considered within the ornithology chapter and oHMP in Technical Appendix 8.9.</p> <p>An Outline Habitat Management Plan/Biodiversity Enhancement Plan will be included as part of the EIA Report Chapter 8: Ecology & Biodiversity.</p>

9.4. Assessment Methodology Significance Criteria

9.4.1. Study Area

29. 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 9.1**. 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 9.2**.
30. 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 features under consideration. Survey Areas were determined based on NatureScot (2017) guidance and on data gathered for the desk study indicating which sensitive species were likely to occur.
31. The following Survey Area extents are applicable to this assessment:
- flight activity survey - Site Feasibility Study Area plus 500 m buffer;
 - moorland breeding bird survey (MBBS) and nightjar (*Caprimulgus europaeus*) - Developable Area plus 500 m buffer;
 - black grouse (*Lyrurus tetrix*) - Developable Area plus 1.5 km buffer;
 - scarce breeding raptor - Developable Area plus 2 km buffer; and
 - breeding bird walkover - Access Track only.

9.4.2. Desk Study

9.4.2.1. Designated Sites

32. 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 close proximity, or potentially connected to the Site.
33. The extent of searches conducted for statutory European/International designated sites (i.e. Special Protection Areas (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 NatureScot (2016)²). Consequently, searches extended up to 20 km from the Application Boundary based on the longest recognised commuting distance (from overnight roosts), which is for pink-footed goose and greylag goose; species which are associated with a number of designated sites in

² SNH (2016). *Assessing Connectivity with Special Protection Areas (SPAs)*. Version 3 – June 2016.



Scotland. Searches for all other designated sites with ornithological features of interest (including Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNRs) and Local Nature Reserves (LNRs)) extended to 2 km from the boundary of the Site. Searches were conducted using the following sources:

- NatureScot's Sitelink database website³;
- Natural England's MAGIC Map application⁴; and
- Joint Nature Conservation Committee (JNCC) website⁵.

9.4.2.2. Data Searches

34. 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 (2014-2023 inclusive)) within 2 km of the Site (10 km for golden eagle (*Aquila chrysaetos*)). The following land management organisations and ornithological interest groups were consulted for any relevant data they may hold:

- Forestry Land Scotland (landowners of the majority of the Site);
- Dumfries and Galloway Raptor Study Group (D&GRSG);
- RSPB Conservation Data Management Unit;
- South West Scotland Environmental Information Centre (SWSEIC);
- Scottish Ornithologists' Club (SOC) bird recorder for Dumfries and Galloway; and
- South of Scotland Golden Eagle Project (SSGEP).

35. 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).

36. Data obtained from the above sources were 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).

9.4.3. Field Surveys

37. 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 Directive⁶;
- Birds listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended⁷);

³ NatureScot Sitelink database website (<https://sitelink.nature.scot/home>).

⁴ Natural England MAGIC Map application website (<https://magic.defra.gov.uk/>).

⁵ JNCC website (<http://jncc.gov.uk/>).

⁶ EU Birds Directive: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0147>

⁷ Schedule 1-listed species of the Wildlife and Countryside Act 1981: <http://www.legislation.gov.uk/ukpga/1981/69/schedule/1>.



- 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 (BoCC5) (Stanbury *et al.*, 2021⁸).
38. Other species which are typically recognised as being potentially vulnerable to the effects of windfarm 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).
39. Full details of the survey methods used to inform this assessment are presented in **Technical Appendix 9.1 Ornithological Technical Report**, with an overview of survey methods provided below:
- Flight activity surveys following NatureScot (2017) guidance. The data from the flight activity surveys was used to undertake Collision Risk Modelling (CRM) using the Band *et al.* (2007⁹) method to predict mortality rates from collisions;
 - Scarce breeding raptor surveys based on methods detailed in Hardey *et al.* (2013¹⁰) and Gilbert *et al.* (1998¹¹);
 - Lekking black grouse surveys following the methodology outlined within Gilbert *et al.* (1998);
 - Breeding nightjar surveys also following methods documented within Gilbert *et al.* (1998);
 - Moorland breeding bird surveys using the Calladine *et al.* (2009¹²) modified version of Brown and Shepherd methodology (Brown and Shepherd, 1993¹³) as summarised in Gilbert *et al.* (1998);; and
 - A single breeding bird walkover of the access track and following the Common Bird Census (CBC) method as summarised in Gilbert *et al.* (1998).

9.4.4. Assessment Methodology

40. Assessment of the significance of effects on ornithological features refers to the staged process outlined in the Ecological Impact Assessment (EclA) guidelines from the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018¹⁴). However, the assessment methodology also uses the commonly matrix approach often used in EIA.

9.4.4.1. Significance Criteria

41. Evaluation of the ornithological resources identified by the baseline studies as IOFs has been guided by the CIEEM (2018) guidelines. In accordance with these guidelines, the

⁸ Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. *The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain.* *British Birds* 114: 723-747.

⁹ Band, W, Madders, M, & Whitfield, D.P. (2007) *Developing field and analytical methods to assess avian collision risk at wind farms.* In: Janss, G, de Lucas, M & Ferrer, M (eds.) *Birds and Wind Farms.* Quercus, Madrid.

¹⁰ Hardey *et al.* (2013). *Raptors. A Field Guide for Surveys and Monitoring.* SNH, Inverness

¹¹ Gilbert, G., Gibbons D.W., and Evans, J. (1998). *Bird Monitoring Methods.* RSPB, Sandy.

¹² Calladine, J., Garner, G., Wernham, C. & Thiel, A. (2009). *The influence of survey frequency on population estimates of moorland breeding birds.* *Bird Study*, Volume 56, Issue 3.

¹³ Brown, A.F. and Shepherd, K, B. (1993). *A method for censusing upland breeding waders.* *Bird Study*, 40: 189-195.

¹⁴ CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK.* Chartered Institute of Ecology and Environmental Management, Winchester. Available at: [ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.2-April-22-Compressed.pdf \(cieem.net\)](#).



importance of each IOF has been assessed in relation to the conservation status of the species over the full range of geographical scales as listed below in **Table 9.2**. These correspond with the categories of conservation value/importance referred to in the Significance of Effects matrix in **Table 9.5**.

Table 9.2 Approach to Classifying the Importance of IOFs

Conservation Importance (Sensitivity)	Conservation Value	Examples
High	International	Site designated as a SPA or Ramsar Site, 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
	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).
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	Local	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).
Negligible	Negligible	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).

42. 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.

43. 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 9.3**.

Table 9.3 Types of Effects

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 (e.g. 0-5 year, 5-15 years and >15 years).
Medium-term	
Long-term	
Beneficial	Effects having a beneficial influence on the environment.
Adverse	Effects having an adverse influence on the environment.

44. The potential effects are determined through understanding how each IOF 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 9.3**);
- The scale/magnitude of the predicted effect (as detailed in **Table 9.4**); and
- Whether there are any cumulative effects that may affect the long-term integrity of the ecosystem(s) at the Site.

Table 9.4 – Criteria for Describing Spatial Magnitude

Magnitude	Description
Large	Total loss or major / substantial alteration to a key elements or features of the baseline conditions to the extent that post-development the character or composition of baseline conditions will be fundamentally changed.
Medium	Loss or alteration to one or more key elements or features of the baseline conditions to an extent that post-development character represents a material change from baseline conditions.
Small	Minor shift away from baseline conditions. Changes arising will be detectable / discernible but not material; the underlying character or composition of the baseline conditions will be like the pre-development situation.
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a 'no change' situation.

45. The level of a potential effect on each IOF was determined by considering the type and magnitude of the effect (Table 9.3 and Table 9.4 in relation to the conservation importance (sensitivity) of the IOF (Table 9.2). Sensitivity is reported on a scale of high, medium, low and negligible and magnitude of change on a scale of large, medium, small and negligible as illustrated in Table 9.5.

Table 9.5 Assessment Matrix

Magnitude of Change / Effect	Conservation Value/Importance of IOF (Sensitivity)				
	High	Medium	Low	Negligible	
Large	Major	Moderate to Major	Minor to Moderate	Negligible	
Medium	Moderate to Major	Moderate	Minor	Negligible	
Small	Minor to Moderate	Minor	Negligible to Minor	Negligible	
Negligible	Negligible	Negligible	Negligible	Negligible	

46. Explanations of the levels of significance are provided below in Table 9.6.

Table 9.6 Levels of Effect Criteria

Level of Effect	Criteria
Major	Only adverse effects are assigned this level of effect 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.
Moderate	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.

Level of Effect	Criteria
Minor	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.
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.

47. The level of effect generated from **Table 9.6** for each impact 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.

48. Where the assessment criteria arrive at an effect of variable level (e.g. ‘Major or Moderate’, see **Table 9.5**), 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.

49. 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 geographical scale (**Table 9.2**) and duration (**Table 9.4**). 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.

50. 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.

51. Results that are ‘Minor’ or ‘Negligible’ effects arising from the development are not considered to be significant (in terms of the EIA Regulations).



52. 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 (NatureScot, 2018). This corresponds with NatureScot (2018) policy 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. The relevant NHZ to the proposed Development is NHZ 19: Western Southern Uplands & Inner Solway, the extent of which is shown in **Figure 9.3**.

9.4.4.2. Cumulative Effects

53. As well as considering the impacts of the proposed Development on IOFs on its own, the EIA Regulations also require the consideration of potential for cumulative effects from other projects and activities to be assessed.
54. In line with NatureScot’s latest guidance on the assessment of cumulative effects (NatureScot, 2018b), developments at the following stages should be factored in when considering cumulative impacts:
- Developments that are already operational and those that are under construction or consented and likely to be built, should be considered first, as the impacts arising from these, once mitigation has been factored in, are unavoidable; and
 - Applications that have been formally submitted to a planning authority or Scottish Government but have yet to be determined, consented and constructed, should then be factored in.
55. Confidential data (e.g., on Schedule 1 species) from such assessments are often not in the public domain.
56. Proposed windfarms that have been rejected by the planning authority or withdrawn by a developer (but not understood to be at appeal) are not included in the cumulative assessment as any future amended layout would have different ornithological effects. Similarly, projects at the pre-application scoping stage of the EIA process were also excluded from the cumulative assessment in this chapter since baseline ornithological surveys are either ongoing or the data are not publicly available and so potential effects of such developments are as yet unknown.
57. The same principles apply to other developments though they may not have the same range of impacts identified for windfarms. For example, a new overhead powerline may increase collision risk, unless birds avoid the powerline altogether, but may present little additional disturbance or habitat loss.
58. The assessment of cumulative effects is also conducted at the regional, NHZ scale (i.e. NHZ 19). The significance of cumulative effects has been assessed following the same criteria detailed in **Section 9.4.4.1**.

9.4.5. Limitations to Assessment

59. Like most outdoor activities in 2020, the breeding season survey programme for the proposed Development was 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.
60. 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 **Technical Appendix 9.1: 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.
61. NatureScot (2017) guidance details that assessments can be undertaken using data “collected within the last 5 years or within 3 years if the populations of key species are known to be changing rapidly”. It is considered that the two years of bird survey data collected between September 2019 and August 2021 provide a robust dataset for the assessment, in addition to the third-party data supplied by FLS, RSPB, D&GRSG and the South of Scotland Golden Eagle Project (SSGEP).
62. The survey areas are dominated by commercial forestry and complex topography, particularly with respect to the Flight Activity Survey Area, which focused on the potential turbine layout. It is understood that complete coverage of the lower sweep height of any proposed turbine layout in such landscapes is difficult (e.g. T07 was not visible at the lower sweep height of 38 m), although this limitation is accounted for the collision risk model. Coupes (individual forestry compartments) within commercial conifer plantations are harvested on rotation and species that live in such habitats, such as goshawk for example, will regularly move nesting areas in response to felling and as such areas of high flight activity are likely to vary across the life of the windfarm.
63. Additionally, the access track between the A701 and the proposed Development was only subjected to a single breeding bird survey visit in May 2024, as it initially fell outside of the ornithological survey areas. Updated surveys of the access track and appropriate buffer zones are proposed to be carried out in the year preceding construction as well as pre-construction, in order to account for changes in target species distribution and potential constraints to construction.

9.5. Baseline Conditions

9.5.1. Designated Sites

64. The Application Boundary does not physically overlap with any internationally or nationally designated sites but two internationally designated sites of ornithological interest were identified within 20 km of the Application Boundary. Details of each of these sites are presented in **Table 9.7** while their locations and distribution in relation to the Site are shown in **Figure 9.3**. There are no non-statutory designated sites with ornithological interests within 2 km of the Site.

Table 9.7 Designated Sites

Internationally Designated Site	Distance and Direction from the Site	Qualifying Interest
Castle Loch, Lochmaben SPA and Ramsar Site	13.0 km southeast	Non-breeding: pink-footed goose.
Upper Solway Flats and Marshes SPA and Ramsar Site	17.2 km south	Non-breeding: bar-tailed godwit (<i>Limosa lapponica</i>), cormorant (<i>Phalacrocorax carbo</i>), curlew (<i>Numenius arquata</i>), dunlin (<i>Calidris alpina schiinzii</i>), golden plover (<i>Pluvialis apricaria</i>), goldeneye (<i>Bucephala clangula</i>), grey plover (<i>Pluvialis squatarola</i>), knot (<i>Calidris canutus</i>), lapwing (<i>Vanellus vanellus</i>), oystercatcher (<i>Haematopus ostralegus</i>), pink-footed goose, pintail (<i>Anas acuta</i>), redshank (<i>Tringa totanus</i>), ringed plover (<i>Charadrius hiaticula</i>), scaup (<i>Aythya marila</i>), shelduck (<i>Tadorna tadorna</i>), barnacle goose (<i>Branta leucopsis</i>), waterfowl assemblage, and whooper swan (<i>Cygnus cygnus</i>). Passage: ringed plover.

9.5.1.1. Designated Sites and their Connectivity to Harestanes West Windfarm

65. The two designated sites referred to in **Table 9.7** are given preliminary assessment as IOFs. As noted previously the Site does not overlap with any statutory or non-statutory designated sites of ornithological interest. The Site is located approximately 13.0 km northwest of Castle Loch, Lochmaben SPA/Ramsar Site designated for non-breeding populations of pink-footed goose and 17.2 km north of the Upper Solway Flats and Marshes SPA/Ramsar Site designated for non-breeding populations of waterfowl, notably pink-footed goose.
66. 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 **Technical Appendix 9.1 Ornithological Technical Report** and **Table 9.9**) demonstrates that geese from these SPAs don't use habitats in proximity of the Site during the winter period (e.g. there is no functionally linked land in proximity to the Site) and the flight activity over the Site was minimal and restricted to the passage periods, the majority was at high altitude. Therefore both sites are scoped out of the assessment.

9.5.2. Protected and Notable Species of Conservation Concern

67. A summary of records derived from data sources described in **Section 9.4.2.2**, is provided below with further details available in **Technical Appendix 9.1: Ornithological Technical Report** and **Technical Appendix 9.2: Confidential Ornithological Information**:
- Goshawk: five territories (comprising ten nest sites) are located within 2 km of the Site, including two territories associated with the part of the proposed Development where turbines are proposed. Additionally, three territories have nesting areas within 500 m of the proposed access track, and a fifth territory located at the edge of the 2 km search area to the south of the Site. Seven records of birds from within the Site and wider surrounding 2 km search area (i.e. the wider Forest of Ae);



- Red kite (*Milvus milvus*): one territory comprising two nest sites located within the 2 km search area to the south of the Site; eleven records of birds over the forestry and open ground within the 2 km search area to the north and west of the Site;
- Short-eared owl (*Asio flammeus*): four records over the open moorland and forest edge habitats within the 2 km search area to the northwest of the Site;
- Long-eared owl (*Asio otus*): a single record along the forest edge within the 2 km search area to the northwest of the Site;
- Hen harrier (*Circus cyaneus*): four records including a single record over the forestry within the Site and three records over the open ground within the wider 2 km search area to the northwest and south of the Site;
- Merlin (*Falco columbarius*): a single record over the open moorland within the 2 km search area to the northwest of the Site;
- Barn owl (*Tyto alba*): five territories (comprising six nesting sites) all of which are located within the 2 km search area to the north, east and south of the Site;
- Black grouse: 28 records relating to 47 lekking/displaying males and five records of individual females all of which within the 2 km search area to the northwest of the Site; and
- Golden eagle: satellite-tag records from 2018-present relating to 25 different individuals were provided. Usage of the proposed Development area was 0.06% of all usage within 10 km of the proposed Development. No nest sites were identified within 10 km of the proposed Development, although a single recurrently used roost site was identified within 2 km of the Site (several roost sites were used within 2 km of the Application Boundary but only very infrequently i.e. an average of two nights across the six year period).

9.5.3. Field Survey Results

68. A summary of field survey results is provided here with full details provided in **Technical Appendix 9.1: Ornithological Technical Report** and **Technical Appendix 9.2: Confidential Ornithological Information**. The field survey results are illustrated in **Figures 9.4a**, although figures illustrating Schedule 1 species nest sites and black grouse lek locations are detailed in **Technical Appendix 9.2**.

9.5.3.1. Flight Activity Survey

69. A total of 265 flights by 15 target species were recorded over and around the Site between September 2019 and August 2021¹⁵. A summary of flight activity results is provided below and should be cross referenced with **Figures 9.4a – 9.5b (Flight Activity Survey Results)**;

- Goshawk: 88 observations involving 95 individual flights. Activity generally being widely distributed over forestry throughout the flight activity survey area. There were however concentrations of activity in the western and central parts of the Site. The frequency of flight activity was comparable between the breeding and non-breeding seasons. In Year 1,

¹⁵ Eight VP locations covered the Initial Site Feasibility Study Area but only six VP locations covered areas of the proposed turbine layout and appropriate buffer zone. Therefore a proportion of the flight activity detailed within this section was over areas that are a considerable distance from the proposed turbine layout.



a total of 24 flights were recorded, comprising 822 seconds at potential collision height within the collision risk zone. In Year 2, a total of 15 flights were recorded, comprising 1,841 seconds at potential collision height within the collision risk zone;

- Red kite: 75 observations involving 83 individual flights. Flight activity was concentrated over the open ground and forest edge habitats to the southeast of the Site and occasional flight activity also being detected in the northern and western parts of the Site. As well as being associated with the open ground and forest edge habitats to the south of the Site around Ae Village but with a reasonable proportion of flights also to the north and north-west of the Site. A total of 17 flights were recorded within the potential collision risk zone (e.g. a buffer of 581m around the proposed turbine locations) over the two-year survey period. A total of 219 and 759 seconds of flight time were recorded within the collision risk zone in Years 1 and 2 respectively. However, only one flight passed through the turbine envelope in Year 1, with two flights recorded passing through this area in Year 2. The majority of flight activity in the collision risk zone was recorded in close proximity to VPs 4, 6 and 15. These VP locations are in proximity to recognisable physical features such as the forest edge, the village of Ae and various field boundaries in the Ae Valley, which means that it likely that the mapped flightlines are highly accurate and therefore were not passing through the turbine envelope;
- Short-eared owl: 13 flights. Flight activity was concentrated in two areas in the north of the survey area which corresponded with suspected breeding territories. There was no flight time recorded within the collision risk zone;
- Peregrine (*Falco peregrinus*): seven flights. These were located over and around the central part of the Site, as well as over the forestry and forest edge habitats to the south and east of the Site. A total of 67 seconds of flight time (from a single flight) was recorded within the collision risk zone;
- Osprey (*Pandion haliaetus*): five flights. Flights were observed over the central and eastern parts of the Site. Three flights were recorded within the collision risk zone, totalling 284 seconds of flight time;
- Hen harrier: three flights. Sightings were distributed around the Site and were typically associated with the open ground and forest edge habitats. A total of 606 seconds of flight time was recorded within the collision risk zone (all relating to a single flight);
- Merlin: two flights. These involved individual birds observed flying along the moorland and forest edge to the south of the Site. A total of 30 seconds of flight time was recorded within the collision risk zone;
- Pink-footed goose: 30 observations involving 2,881 individual flights. Flights observed during the autumn and early winter months were typically southward-bound while those observed in the late winter and early spring were typically northward-bound. Only two flights (totalling 104 birds) in Year 1, and two flights (totalling 114 birds) in the 2021 breeding season were recorded traversing through the proposed Development and a 581 m buffer at collision risk height;
- Greylag goose (*Anser anser*): six observations involving 31 individual flights. Most of the flights were orientated along the open ground of the lower valley north of Ae Village. In Year 1 only three individuals flew through the collision risk zone at potential collision height and in Year 2 this was only 23 individuals (from two separate flights);



- Whooper swan: two observations involving 46 individual flights. These flights were observed over the central and southern parts of the Site. These flights were observed during autumn migration and were orientated southwards indicating that these were migratory flights. No flight time was recorded within the collision risk zone;
- Golden plover: one flight involving four individuals. This flight was observed flying over the central forested part of the Site during the autumn passage period and spent 75 seconds within the collision risk zone;
- Curlew: three flights. These were located over the open moorland and fields to the north, east and south of the Site;
- Lapwing: 15 observations involving 22 individual flights. These were located over the open moorland and fields to the north, east and south of the Site. In Year 1 there were no seconds of flight time at collision risk height within the collision risk zone. A total of 30 seconds of flight time was recorded within the collision risk zone in Year 2;
- Snipe (*Gallinago gallinago*): 11 observations involving 12 individual flights. These flights were located over open moorland to the north of the Site and fields either side of the C-class road to the north of Ae Village, east of the Site. A total of 45 seconds of flight time was recorded within the collision risk zone; and
- Oystercatcher: four flights. These flights were located over open moorland to the north of the Site and fields either side of the C-class road to the north of Ae Village, east of the Site. No flight time was recorded within the collision risk zone.

9.5.3.2. Scarce Breeding Raptor Survey

70. The results of the Scarce Breeding Raptor Surveys are summarised below. Full details are provided in **Technical Appendix 9.2: Confidential Ornithological Information**, with other scarce raptor observations being presented in **Figures 9.6a -9.6b**.

9.5.3.3. Barn Owl

71. The scarce breeding raptor surveys included checks of old derelict buildings. However, no barn owl nest sites were located. Fresh barn owl pellets were identified north-west of the Site in 2020 and a barn owl was observed incidentally during a black grouse survey in May 2021 to the north of the Site, thereby confirming the species presence locally. However, there was no evidence of breeding activity by this species within the survey area during the field survey programme.

9.5.3.4. Goshawk

72. At least three active goshawk nest sites were identified within the 2 km survey area during the surveys in 2020. Two of these were located within 500 m of the Site boundary to the west while the other active nest site was located over 1.5 km to the east from the Application Boundary. A fourth goshawk breeding territory was located to the southeast of the Site. However, dense windblown trees precluded detailed searches and no active nest site was located, and there were no sightings of goshawk indicative of an active breeding attempt (e.g. sightings of or begging calls by young). During the 2021 surveys, the nest site to the west of the Site was again found to be active, while the nest site 1.5 km to the east of the Site was found to be occupied. Goshawk were suspected to potentially be



breeding at (at least) two other locations to the north and south of the Site but no other active nest sites were located.

9.5.3.5. Red Kite

73. Frequent red kite flights were observed over the open moorland and along the forest edge habitats surrounding the Site, the majority of which were associated with a nesting attempt to the south of the Site in 2020. Although no chicks were seen during a nest check later in the season, third-party data from the D&GRSG confirmed that the nest fledged two chicks. The nest site to the south of the Site was again found to be active during the 2021 breeding season and fledged two chicks. Multiple sightings of red kites were again made over the open ground and forest edge to the north of the Site and an active nest was located but this was beyond the 2 km survey buffer to the north-west. Only one flight was recorded within the Application Boundary over the two-year period.

9.5.3.6. Short-eared Owl

74. Three active short-eared owl breeding territories were identified in 2020, all of which were located to the north of the Site (only one was recorded within 2 km of the Site). Two of these were located in the open moorland while the third was located in an area of clear-felled forestry. Breeding was suspected at these locations based on the birds' observed behaviour (territorial behaviour including caching prey); however, the nest sites were not located and no young were observed. By comparison, no short-eared owls were recorded during the 2021 breeding season, despite comparable survey effort in the same areas of suitable habitat.

9.5.3.7. Other Raptor and Owl Species

75. Other raptor species which were frequently recorded throughout the survey and considered likely to be breeding within the Site were common buzzard (*Buteo buteo*), sparrowhawk (*Accipiter nisus*) and kestrel (*Falco tinnunculus*). A tawny owl (*Strix aluco*) was also observed during the surveys and was also considered likely to be breeding within the woodland habitats on the Site.

9.5.4. Lekking Black Grouse Surveys

76. The results of the Lekking Black Grouse Surveys and associated figures can be found in **Technical Appendix 9.2 Confidential Ornithological Information**. No black grouse were recorded lekking within 2 km of the Application Boundary during either of the survey years.

9.5.4.1. Breeding Nightjar Surveys

77. No nightjar were recorded (seen or heard) during any of the surveys undertaken and the species is considered to have been absent from the surveyed areas.

9.5.4.2. Moorland Breeding Bird Surveys

78. A total of 13 target species were recorded, seven of which are potentially vulnerable to the effects of windfarms (i.e. six species were passerines). Goshawk and red kite were the only Annex I and/or Schedule 1 listed species, which bred within the survey area. **Table 9.8** presents estimated territory numbers for target species, the distribution of which are shown in **Figures 9.7a -- 9.7b**.

Table 9.8 Estimated Number of Territories for Target Species from Moorland Breeding Bird Survey

Species	Conservation Status			Presence/Min. No. of Breeding Territories within the Survey Area
	EU Annex I	WCA Sch. 1	BoCC Red List	
Curlew			✓	2
Goshawk		✓		3
House Sparrow <i>(Passer domesticus)</i>			✓	Present
Lapwing			✓	2
Redpoll <i>(Acanthis flammea)</i>			✓	Present
Linnet (<i>Carduelis cannabina</i>)			✓	Present
Merlin	✓	✓	✓	Present
Oystercatcher				2
Red Kite	✓	✓		1
Skylark (<i>Alauda arvensis</i>)			✓	Present
Snipe				8
Spotted Flycatcher <i>(Muscicapa striata)</i>			✓	Present
Tree Pipit <i>(Anthus trivialis)</i>			✓	Present

9.5.4.3. Breeding Bird Survey Walkover

79. Direct Ecology Ltd undertook a single breeding bird survey walkover of the proposed access track route in May 2024 in order to ascertain the breeding bird assemblage along the route. The survey recorded all species and focused on birds exhibiting breeding bird behaviour and/or nests, although the latter were not searched for directly. An estimate of breeding territories cannot be given as this cannot be determined from a single visit.
80. Species recorded included woodland, moorland and few wetland species such as teal (*Anas crecca*) and mallard (*Anas platyrhynchos*). Almost all records were of birds exhibiting some sort of breeding behaviour, usually territoriality. These included common species typical of the local habitats and geographical location of the Site and also a number of notable species including red-listed species cuckoo (*Cuculus canorus*), skylark, mistle thrush (*Turdus viscivorus*), tree pipit and redpoll; barn owl and crossbill (*Loxia curivox*), which both receive additional legal protection under Schedule 1.

9.5.4.4. Protected and Notable Species of Conservation Concern

81. A total of 27 species met at least one of the target species criteria identified in **Section 9.4.3** and therefore constitute the preliminary list of IOFs of the proposed Development. A summary of their presence, conservation value, and a rationale for scoping in or out is given in **Table 9.9**.
82. The aim of the EclA 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 local scale or above (for example if no breeding was recorded and Site occurrence was rare; or are species that are not affected by windfarm developments). Consequently, such effects do not require assessment under the terms of the EIA Regulations and NatureScot (2018b) guidelines.
83. Although a number of the species that have been scoped out through the above process are red or amber-listed species of conservation concern (Stanbury *et al.* 2021) and/or are represented on the SBL/Dumfries and Galloway LBAP, and would therefore generally be considered to be of regional conservation value (see **Table 9.2**) 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) 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.
84. As outlined earlier, NatureScot (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 SBL or BoCC5 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 therefore omitted from the impact assessment where their occurrence relative to the proposed Development was of no more than Local importance.

Table 9.9 IOFs within IOFsw the Survey Area.

Species or Species Assemblage	Recorded Presence DS: Desk Study, FAS: Flight Activity Survey, SBRS: Scarce Breeding Raptor Survey, MBBS: Moorland Breeding Bird Survey, LBGS: Lekking Black Grouse Survey.	Conservation Value in Context of the Site	Scoped IN/OUT	Rationale
Barn owl	<p>DS: Five home ranges (six nest sites).</p> <p>FAS: No records.</p> <p>SBRS: Pellets recorded.</p> <p>BBW: Oneone record.</p>	Site: Local	OUT	<p>Pellets located outside a suitable structure for breeding and a single bird observed at another location to the north of the Site (i.e. outwith 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 3 m above the ground (The Barn Owl Trust, 2024¹⁶).</p> <p>A single nest within 100 m of the access track was identified through the desk study process. The regional population has exceeded 100 pairs recently (in 2018, a total of 248 known sites were checked of which 116 were occupied by pairs and 21 other sites occupied by single birds) and therefore a single pair using a nest site is of local importance (Challis <i>et al.</i> 2018¹⁷). It is considered that embedded measures detailed within a BBPP (e.g. pre-construction checks for presence and if the birds are present, access track upgrades would be undertaken outside of the breeding season) would negate any effects on this feature and thus it is scoped out of further assessment.</p>
Black grouse	DS: Three leks identified with lekking males present at each.	Site: Negligible	OUT	No black grouse leks or sightings of black grouse were recorded within the Site in both 2020 and 2021 survey periods. The nearest lek, identified from the desk study, is located over 2 km from the Application Boundary the details of

¹⁶ Barn Owl Trust. Wind Turbines and Barn Owls. Available from: <https://www.barnowltrust.org.uk/hazards-solutions/barn-owls-wind-turbines/> [Accessed in August 2024]

¹⁷ Challis, A., Eaton, M., Wilson, M.W., Holling, M., Stevenson, A. and Stirling-Aird, P. (2019). Scottish Raptor Monitoring Scheme Report 2018. BTO Scotland, Stirling.

Species or Species Assemblage	Recorded Presence DS: Desk Study, FAS: Flight Activity Survey, SBRS: Scarce Breeding Raptor Survey, MBBS: Moorland Breeding Bird Survey, LBGS: Lekking Black Grouse Survey.	Conservation Value in Context of the Site	Scoped IN/OUT	Rationale
	<p>FAS: No records.</p> <p>LBGS: One lek identified with a peak count of three males.</p>			which can be found in Technical Appendix 9.2: Confidential Ornithological Information . The lek sight identified during the baseline surveys in 2020 and 2021 falls more than 2.5 km from the Application Boundary and over 3.5 km from the nearest proposed turbine.
Breeding passerine (songbird) assemblage	<p>MBBS: Six6 target species recorded.</p> <p>BBW: Five5 target species recorded.</p>	Site: Local	OUT	Territories for six passerine species were located within 500m of the Site during the MBBS and five species during the BBW (totalling eight target species), on pastoral agricultural land, open moorland and associated forest edge habitats. All species were recorded in low numbers. Passerines are generally not considered at risk of significant impacts from windfarm developments (NatureScot, 2017).
Breeding wader assemblage	<p>FAS: Five target species recorded, all species with ≤ 15 flights total.</p> <p>MBBS: Four target species recorded.</p>	Site: Negligible	OUT	Two territories each recorded for curlew (BoCC5 red listed), lapwing (red listed) and oystercatcher (green listed), and eight territories for snipe (amber listed). All territories were located outwith the Site and all represent low abundance compared to reference populations. Scottish breeding population estimates were 58,800 pairs, 71,500-105,600 pairs, 42,000-50,000 pairs and 84,500-116,500 pairs for curlew, lapwing, snipe and oystercatcher respectively (Forrester <i>et al.</i> , 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, curlew 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.

Species or Species Assemblage	Recorded Presence DS: Desk Study, FAS: Flight Activity Survey, SBRS: Scarce Breeding Raptor Survey, MBBS: Moorland Breeding Bird Survey, LBGS: Lekking Black Grouse Survey.	Conservation Value in Context of the Site	Scoped IN/OUT	Rationale
Golden eagle	<p>DS: Nono nest sites within 10 km, one roost sitesites within 2 km, 25 satellite tagged individuals recorded within 10 km.</p> <p>FAS: Nono records.</p> <p>SBRS: Nono records.</p>	Site: Negligible	OUT	<p>The golden eagle records were largely located within the open ground to the north of the Site, with only 0.06% of all fixes within 10 km falling within 581 m of the turbine layout.</p> <p>A single recurrently used roost within 22 km of the access track was identified through the desk study process (more than ten nights between 2018-present). It is considered that embedded measures detailed within a BBPP (e.g. pre-construction checks for presence and if the birds are present, access track upgrades would be undertaken when roosts are not in use and/or avoid one hour either side of sunrise/sunset) would negate any effects on this feature and thus it is scoped out of further assessment.</p>
Goshawk	<p>DS: Five territories comprising 10 nest sites.</p> <p>FAS: 88 flights.</p> <p>SBRS: Four active nest sites.</p>	Site: Regiona	IN	<p>Four active nest sites were located within the SBRS Area. Although nest sites were located outwith the Site and over 500 m from the nearest turbine location, taking consideration of this species flight behaviour and relatively large home range, goshawk may be at risk of impacts from the proposed Development through collision with wind turbines and through disturbance/displacement. The three territories that may overlap the Site represent a potentially significant proportion of the regional (6%) population, which was estimated at 50 pairs in 2022 (Eaton and the Rare Breeding Birds Panel (RBBP) 2024¹⁸). The latest national population estimate is a minimum of 315 breeding pairs (Eaton and the RBBP, 2024), is likely to be conservative and continues to increase each year (e.g. the RBBP reports that the UK population has increased from 820 pairs in 2019, to 864 pairs in 2020, to 1,012 pairs in 2021 and 1,252 pairs in 2022). Additionally, given the location/spacing of each of</p>

¹⁸ Eaton, M. and the Rare Breeding Birds Panel. (2024). Rare Breeding Birds in the UK in 2022. British Birds 117, November 2024, 591-656.

Species or Species Assemblage	Recorded Presence DS: Desk Study, FAS: Flight Activity Survey, SBRS: Scarce Breeding Raptor Survey, MBBS: Moorland Breeding Bird Survey, LBGS: Lekking Black Grouse Survey.	Conservation Value in Context of the Site	Scoped IN/OUT	Rationale
				the nest sites recorded in 2021, the proposed Development is only likely to form part of a maximum of two goshawk territories (in 2020 only a single nest site was recorded in proximity to the Proposed Development).
Greylag goose	FAS: Six flights (totalling 31 birds.) BBW: ~Two2 feral birds recorded.	Site: Negligible	OUT	Recorded rarely and in low abundance passing over the Site only with negligible risk of collision mortality.
Hen harrier	DS: Four records. FAS: Three flights. SBRS: No evidence of breeding.	Site: Negligible	OUT	No evidence of breeding in the SBRS Survey Area. With only low activity consisting of three flights distributed around the Site. As per Haworth and Fielding (2012), the overall conclusions of their review of the impacts of terrestrial wind farms on breeding and wintering hen harriers, concluded that <i>“hen harriers experience some small scale displacement but generally there are no significant large scale impacts caused by wind farms”</i> . Therefore, this species was scoped out given that activity of this species on Site was negligible and impacts on them are unlikely.
Merlin	DS: One record. FAS: Two flights. SBRS: no evidence of breeding.	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.
Osprey	FAS: Five flights. SBRS: no evidence of breeding.	Site: Negligible	OUT	No evidence of breeding within the SBRS Survey Area. There was a very low amount of flight activity recorded with a total of five flights, only one of these was over the Site.



Species or Species Assemblage	Recorded Presence DS: Desk Study, FAS: Flight Activity Survey, SBRS: Scarce Breeding Raptor Survey, MBBS: Moorland Breeding Bird Survey, LBGS: Lekking Black Grouse Survey.	Conservation Value in Context of the Site	Scoped IN/OUT	Rationale
Peregrine	<p>FAS: Seven flights.</p> <p>SBRS: No evidence of breeding.</p>	<p>Site: Negligible</p>	OUT	Recorded rarely in low abundance, passing over the Site only with negligible risk of collision mortality.
Pink-footed goose	<p>FAS: 30 flights (totalling 2,881 individuals).</p>	<p>Site: Negligible</p>	OUT	<p>Recorded rarely and in low abundance, passing over the Site only with negligible risk of collision mortality. Only two flights in Year 1 and two flights in Year 2 were recorded at potential collision height within the collision risk zone. The majority of flight activity was at high altitude, considerably above the upper sweep height of the proposed turbines. Additionally, the pink-footed goose avoidance rate is 98.8% (NatureScot 2018) and when applied to such a small number of flights, the number of potential collision related deaths is likely to be negligible.</p> <p>No evidence of connectivity with qualifying populations for SPAs in the wider region (commuting flights to/from night roosts were not recorded over the Site; only flights of migrating individuals in spring and autumn, which could be attributed to any SPA to the south of the Site). Mitchell (2012) and the 2022/23 BTO Wetland Bird Survey Report (Woodward <i>et al.</i>, 2024) highlights that Castle Loch, Lochmaben is no longer used by pink-footed geese and therefore no impacts could occur on this population in absentia. Additionally, the WWT (2015a-c) reports on anthropogenic mortality on this species and also the Solway Firth population highlighted that the local and UK population has increased and then remained stable, despite this species being heavily shot throughout the autumn (estimates that 25,000 are killed per annum in the UK, with a further 14,000 killed on their breeding grounds in Iceland each year). Additionally, Durr (2023) only has a single collision reported death of this species in Germany, with no reports in the UK.</p>

Species or Species Assemblage	Recorded Presence DS: Desk Study, FAS: Flight Activity Survey, SBRS: Scarce Breeding Raptor Survey, MBBS: Moorland Breeding Bird Survey, LBS: Lekking Black Grouse Survey.	Conservation Value in Context of the Site	Scoped IN/OUT	Rationale
Red kite	DS: 11 records, one territory with two nest sites. FAS: 75 flights. SBRS: A single active nest site.	Site: Local	OUT	This species was confirmed as breeding within the SBRS Survey Area. There was a relatively moderate amount of flight activity recorded for red kite although almost all flight activity was located outside the Site.
Short-eared owl	DS: Four records. FAS: 13 flights. SBRS: Three active breeding territories.	Site: Local	OUT	Open moorland and areas of clear-felled forestry to the north of Site presents suitable nesting habitat for short-eared owl and three breeding territories were identified (all outside of the Site). There was also a negligible level flight activity recorded within the Site.
Teal	BBW: one record.	Site: Negligible	OUT	Recorded only once, so scoped out.
Whooper swan	FAS: 46 flights.	Site: Negligible	OUT	Negligible risk of collision mortality with only two flights comprising 46 individuals (eight at PCH).

85. After the preliminary assessment of IOFs outlined in **Table 9.9** one IOF remains scoped in for further assessment: goshawk.

**9.5.4.5. Reference Populations and Conservation Status of the Scoped in IOF:
Goshawk**

86. The level of a potential effect on the IOF was determined by considering the magnitude, extent and duration of the effect in relation to the conservation importance (sensitivity) of the IOF within the context of the reference population.
87. NatureScot (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”*.
88. This is likely to be the case where a moderate adverse effect (or higher), not likely to be tolerable, is predicted using the impact assessment matrix procedure methodology discussed in **Section 9.4.4.1**, although expert judgement is applied in all cases.
89. The term ‘favourable conservation status’ (as articulated within the Habitats Directive) is defined by NatureScot (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.
90. The conservation status of each IOF 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 (NatureScot, 2018a).
91. For breeding birds, the regional scale equates to NatureScot’s NHZs, where there is high biogeographical coherence within each zone, this scale is appropriate for goshawk. In this case, the proposed Development lies within NHZ 19. The extent of this NHZ and the location of the proposed Development within/between them is presented in **Figure 9.3**. Other populations (e.g. Scottish Raptor Study Group survey areas; RBBP regional study areas etc) would however be considered where appropriate.



92. 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 IOF's current population and recent trends. These are presented herein.
93. Goshawk is listed on Schedule 1 of the Wildlife and Countryside Act, although it is green listed in the latest BoCC report (Stanbury *et al.* 2021) due to its expansion since the mid-20th century. The 25-year UK trend is a strong increase which was noted as +241% in 2022, and the most recent population estimate in 2022 stands at 954 breeding pairs (range 740-1,252 confirmed breeding pairs) in the UK (Eaton and the RBBP, 2024). The RBBP reports an estimate of a minimum of 315 pairs (including territorial presence where no breeding was confirmed) in Scotland in 2022.
94. In an assessment specific to bird populations within each NHZ (Wilson *et al.* 2015) the goshawk breeding population in NHZ 19, 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 NHZ 18, Wigtown Machars and Outer Solway, largely comprised of coastal habitats relatively 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. Eaton and the RBBP (2024)) of 50 pairs in the region. There are 69 known territories in Dumfries and Galloway, although not all of them have been known to be occupied in the same year (D&GRSG *pers. comm.*).
95. The goshawk population estimates detailed above are almost certainly underestimates given this species' secretive nature and choice of nest location in dense coniferous forestry, however. 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 is over 1,591 pairs and the Scottish population forms around 20%, including an estimate of a minimum of 117 pairs in Southern Scotland (Eaton and the RBBP, 2024).
96. Based the above information, goshawk is considered to have a favourable conservation status at a national and regional level. Based on the field surveys results, the Site has been shown to support up to three goshawk territories, which represents 6% of the most recent regional population but less than 1% of the national population. However, **Table 9.9** outlines that the value of the Site is regional as the latest national population estimate is from 2022, is likely to be conservative and continues to increase each year. Additionally, given the location/spacing of each of the nest sites recorded in 2021, the proposed Development is only likely to form part of a maximum of two goshawk territories (in 2020 only a single nest site was recorded in proximity to the Proposed Development). Consequently, the Site is considered to support a population of **regional** importance.

9.6. Embedded Mitigation

97. Primary mitigation includes modifications to the location or design of the proposed Development made during the pre-application phase that are an inherent part of the project, and do not require additional action to be taken. Detailed constraints advice was provided during the iterative layout design process for the turbines and associated



infrastructure features. At various stages during the design stage, desk study and field survey data were used to inform the proposed Development's design.

98. With regards to ornithological features of interest, the design of the proposed Development has taken account of the recorded locations of goshawk nest sites (and other scoped out features such as short-eared owl nest sites) located within the Site.
99. Turbines have been positioned at least 500 m away from all known goshawk and short-eared owl nest sites.
100. Standard best practice during the construction of the proposed Development will also be followed for all breeding birds to ensure that no contravention of wildlife legislation occurs. It is proposed that this is detailed within a BBPP and is secured as a Condition of the proposed Development.
101. 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; and
 - 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.
102. Additional mitigation measures that would be included in the BBPP would also include standard best practice. Standard best practice for breeding birds would be followed during construction, and would include:
 - 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; and
 - 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.

9.7. Potential Effects

103. 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.

9.7.1. Construction

9.7.1.1. Habitat Loss

104. Direct habitat loss through windfarm construction may result in loss or fragmentation of nesting or foraging habitat for bird species. In the context of windfarms, 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.
105. 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).
106. The predominant Phase 1 habitat type is coniferous plantation woodland which is of low conservation value for most IOFs, 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.
107. 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 goshawk 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 IOFs in this wider context.

9.7.1.2. Nest Sites

108. At least three active goshawk nest sites were identified within the 2 km survey area during the surveys in 2020. Two of these were located within 500 m of the Site to the west of the proposed turbine layout while the other active nest site was located over 1.5 km from the access track. A fourth goshawk breeding territory was located approximately 3 km from the Site.
109. During the 2021 surveys one of the nest sites to the west of the Site was active again, while the nest site 1.5 km from the access track was also found to be occupied. Goshawk were suspected to potentially be breeding at (at least) two other locations to the north and south of the Site but no other active nest sites were located.
110. Additional historical data provided by other sources (D&GRSG and FLS) showed five territories (comprising ten nest sites) are located within 2 km of the Site, including two territories associated with the windfarm part of the Site. Additionally, these two territories along with a third territory have traditional nesting areas within 500 m of the proposed access track (one of which was recently felled). Two further territories are located more than 750 m from the Site. The construction of the windfarm would not result in the direct loss of any of the nest site locations discussed (likely to be **No Effect**).

9.7.1.3. Foraging Habitat

111. 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 gamebirds (e.g. pheasant (*Phasianus colchichus*) and red-legged partridge (*Alectoris rufa*)), woodpigeons (*Columba palumbus*), corvids (e.g. carrion crow (*Corvus corone*) and rook (*Corvus frugilegus*)) and thrushes (*Turdus* sp.) (Forrester *et al.* 2007). Goshawks typically operate within a core home range of around 3 km from their nest and generally range no more than 10 km (NatureScot, 2016), thus giving a typical foraging area of around 2,827 hectares (ha) and up to 31,415 ha. 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.
112. 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 hardstanding distributed throughout the wider forest (as opposed to large swathes of habitat). For example, the area of woodland (of all types) lost will be 6.13 ha representing 0.78% of the total amount of this habitat within the Site. Therefore, it is likely that the goshawks would be relatively undeterred from continuing to hunt over these areas during the construction phase, which would still form suitable hunting habitat (edge habitats are likely to be used for surprise hunting for example).
113. 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 2,827 ha as detailed above. Within this wider area there is considered to be an abundance of alternative and equally suitable foraging habitat. Conversion of small areas of woodland to more open habitats is unlikely to negatively impact the species, given that many of their prey species such as red grouse for example are taken in open habitats rather than within plantations. Any loss of habitat is therefore predicted to have a very likely **minor adverse effect** at the local (territory), regional (NHZ) and national levels, which is '**Not Significant**' in terms of the EIA Regulations.

9.7.1.4. Disturbance and Displacement

114. 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 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 such as goshawk, if mitigation measures are not followed.

9.7.1.5. Nest Sites

115. As mentioned above, the three active goshawk nest sites recorded during surveys to inform this assessment were over 500 m from the nearest turbine location.



116. 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 750 m from a nest and that nest abandonment was likely to occur when the disturbance source was within 100 m of a nest site. Disturbance free zones of 400 m during the nest building and incubation period, reduced to 200 m once the young are at least 10 days old, have been advocated in several studies, although a disturbance free zone of 300-500 m is a more widely accepted precautionary range.
117. 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.
118. However, two aspects of the construction activities require further consideration. Blasting to open up borrow pits may be required to facilitate the proposed Development, which 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 is over 1 km distance.
119. The latest research on disturbance details that a 1 km buffer zone is used in North America to protect nesting goshawks from forestry operations, specifically blasting (Anon, 2012 in Goodship and Furness, 2023¹⁹). Although there is an absence of information on goshawk disturbance reactions to blasting activities in the UK, Ruddock and Whitfield (2007) cite a study on North American prairie falcons (*Falco mexicanus*) 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 140 dB, 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 560-1,000 m.
120. 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 (notwithstanding 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 (i.e. over 1 km) 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 very likely **Negligible**, which is '**Not Significant**' in terms of the EIA Regulations.

¹⁹ Goodship, N.M. and Furness, R.W. (MacArthur Green). *Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.*



121. 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 140 m from one of the goshawk nest sites identified during surveys to inform this assessment.
122. 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.
123. There are reported instances however, where goshawks have successfully nested within 20 m of active and publicly used forestry tracks and within 250 m from a busy A-class road (Fauch Hill Sustainable Energy Ltd. 2012²⁰). 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 190 m from the active nest during the latter stages of the breeding season (RPS, 2014²¹).
124. 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.
125. Despite the regional value of the Site to the goshawk population, the temporary and short-term nature of the impact means that the overall impact magnitude is likely to be small, resulting in no more than a **minor adverse effect**, which is '**Not Significant**' in terms of the EIA Regulations.
126. 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 one pair within Ae Forest used four different nest site locations within 350 m 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 likely **negligible effect**, which is '**Not Significant**' in terms of the EIA Regulations. 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

²⁰ Fauch Hill Sustainable Energy (FHSE) Ltd. (2012). *Fauch Hill Wind Farm Environmental Statement*. Natural Research Projects Ltd. for FHSE Ltd.

²¹ RPS (2014). *Harestanes Wind Farm Year 1 Post-construction Raptor Monitoring Summary Report (2014)*. Confidential Report prepared by RPS for Scottish Power Renewables Ltd. September 2014.



levels as long as cover reduction does not exceed about 30% (Penteriani and Faivre, 2001, in Rutz *et al.* 2006²²).

127. If the works are programmed to take place outside of the breeding season, then any effects described above would be avoided (virtually certain **no effect**).

9.7.1.6. Foraging Habitat

128. 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.
129. Therefore, the potential disturbance of goshawks from their foraging habitat during construction is predicted to have a very likely **negligible** effect, which is '**Not Significant**' in terms of the EIA Regulations.

9.7.2. Operation

9.7.2.1. Disturbance and Displacement

130. 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.
131. 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.

9.7.2.2. Nest Sites

132. As discussed above, the three goshawk nest sites identified during surveys to inform this assessment were over 500 m from the nearest turbine location, while details provided of historic nest sites showed the closest nest site locations to be between 330 m from the

²² Rutz, C., Bijlsma, R.G., Marquiss, M., Kenward, R. (2006). *Population Limitation in the Northern Goshawk in Europe: A Review with Case Studies. Studies in Avian Biology, Volume 31:158-197*



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 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 a likely **negligible effect**, which is '**Not Significant**' in terms of the EIA Regulations.

9.7.2.3. Foraging Habitat

133. 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 still represent potential goshawk foraging habitat.
134. 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 500 m 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 81 m). This would effectively render an area of approximately 2.0 ha of habitat/airspace unavailable to goshawks to hunt over per turbine: a total of approximately 24 ha 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 300-500 m disturbance limit for nesting goshawks (Ruddock and Whitfield, 2007; in Goodship and Furness, 2023), it is possible that foraging birds may avoid the turbines within this disturbance range.
135. Taking the area encompassing the 81 m rotor swept area around the 12 turbines, plus the upper limit of the potential disturbance ranges indicated for nesting goshawk (a 500 m buffer), this would account for a small percentage of the species wider 10 km foraging range especially when accounting for inter-turbine radial zone overlap.
136. 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 200 m of the turbines (RPS, 2014). It is more likely therefore, that goshawks would continue to forage within the lower



end (300 m) disturbance range from the operating turbines and the effective habitat loss through displacement is predicted to be closer to 200 m.

137. 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 value of the Site to the goshawk population, is predicted to result in an effect of no more than a likely **minor adverse effect**, which is '**Not Significant**' in terms of the EIA Regulations.

9.7.2.4. Collision with Turbines

138. 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 like goshawk). Conversely, the effect would often be insignificant for short-lived species with high reproductive rates found at high densities, including most passerines.
139. 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 around 60% of all observed goshawk flights being recorded during these periods (see **Technical Appendix 9.2: Confidential Ornithological Information**). Due to this flight behaviour, it is recognised that VP surveys are unlikely to detect and adequately represent the true levels of goshawk flight activity at any site (NatureScot, 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.
140. Based on the observed flight activity, the collision risk model estimates 0.444 goshawk collisions every year using the worst-case scenario (e.g. data from the year in which most activity was recorded, namely combining the 2019-20 non-breeding and 2021 breeding seasons), as calculated using the recommended 98% avoidance rate for this species (NatureScot, 2018). This equates to one goshawk mortality approximately every 2.25 years and approximately 17-18 mortalities over the 40-year operational life span of the proposed Development. Using data from Year 1 only (i.e. September 2019 to August 2020), the CRM calculated an annual collision rate of 0.176; whereas Year 2 data (September 2020 to August 2021) resulted in an annual collision rate of 0.343. The assessment herein is therefore precautionary and presents an absolute worst-case scenario.
141. At the regional (Dumfries and Galloway) level the predicted collision rate would represent the loss of approximately 1% of the estimated breeding population every 2.25 years based on an estimated 50 pairs (100 individuals), although it is considered that not all collision deaths would relate to adult birds. At the national level, this translates to 1% of the estimated breeding population every ~14.5 years, based on an estimated 315 pairs (650 individuals).



142. 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 50 pairs (i.e. 100 individuals) would therefore be expected to have a natural adult mortality rate of 15-21 birds per year. This equates to 34-47 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. one death every 2.25 years). This equates to an increase of 2.13-2.94% of the natural adult mortality rate²³.
143. 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 regional (and national) population, compared to the background mortality rates. Additionally, Scottish Raptor Monitoring Scheme data has shown that over the period 2009-18, the breeding numbers in Dumfries and Galloway have not changed significantly, although nest success has declined in this period, which could be expected as the species reaches carrying capacity.
144. Consequently, the effect of collision related deaths by the operation of the proposed Development is anticipated to be of no more than small magnitude which, given the value of the Site to the goshawk population, is predicted to result in an effect of no more than a likely **minor adverse effect**, which is '**Not Significant**' in terms of the EIA Regulations.

9.7.2.5. Barrier Effects

145. Individual turbines or the whole turbine array/windfarm development footprint 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.
146. 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.
147. Forest of Ae, within which the proposed Development lies, is part of a much larger interconnected band of commercial forestry which extends approximately 30 km to the northeast, including Castle O'er Forest, Eskdalemuir Forest and Craik Forest. This forestry is largely surrounded by agricultural land and open moorland which also represents good quality foraging habitat for locally occurring goshawks.
148. The proposed Development is a relatively small extension to the operational Harestanes Windfarm to the northeast which, in combination with the adjacent Minnygap Windfarm and the proposed Harestanes South Windfarm Extension, potentially forms a barrier to goshawk flight activity extending for approximately 12 km (i.e. the upper extent of their core range (NatureScot, 2016)). Although relatively small, the proposed Development footprint potentially increases this barrier effect by cutting off flight routes around the southern

²³ It is understood that not all collision related deaths would be adults but also sub-adults and more likely inexperienced juveniles.



edge of the Forest of Ae which goshawks could currently use to avoid operational wind turbines.

149. 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; in Goodship and Furness, 2023). Consequently, the presence of the proposed wind turbines may not deter goshawks from accessing parts of their wider territory at all.
150. 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 value of the Site to the species, this would very likely result in a **minor adverse effect**, which is **'Not Significant'** in terms of the EIA Regulations.

9.7.3. Potential Decommissioning Effects

151. Consent for the proposed Development is being sought for an operational life of **40 years**, after which, the proposed Development would be decommissioned, and the turbines dismantled and removed (refer to **Chapter 3**).
152. A detailed methodology cannot be finalised until immediately prior to decommissioning. However, impacts would be similar to the construction phase and would be undertaken in line with relevant policy and legislation at that time.
153. Potential impacts on ecological features resulting from decommissioning activities would be expected to be similar to those during the construction phase and therefore have not been assessed separately in this chapter.

9.7.4. Cumulative Assessment

9.7.4.1. Background Information

154. The above sections have considered the implications of the proposed Development on goshawk in isolation from potential effects of other projects and activities. However, the EIA Regulations also require the potential for cumulative effects to be assessed.
155. According to the relevant NatureScot guidance (NatureScot, 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; and
 - 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.

156. For windfarms which do not influence designated sites, NatureScot (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 10 km of the proposed Development; 10 km being the species' typical maximum foraging range (NatureScot, 2016).

157. Based on this range of assessment of 10 km, the following five development sites have been scoped into this cumulative impact assessment:

- Harestanes Windfarm;
- Harestanes South Windfarm Extension;
- Minnygap Windfarm;
- Dalswinton Windfarm; and
- Daer Windfarm.

158. **Table 9.10** details goshawk observations from the five windfarms.

Table 9.10 Goshawk records from within 10 km of the proposed Development

Windfarm	Status	Distance	Details of Recorded Goshawk Activity
Harestanes Windfarm	Operational	3.1 km	Goshawk bred on the periphery of the site but there were no records from flight activity surveys (zero flights at collision risk)
Harestanes South Windfarm Extension	In planning	4.1 km	Goshawk flight activity recorded, impact on goshawk largely negligible with no more than "slight adverse". Predicted collision risk 0.3 birds per year.
Minnygap Wind Farm	Operational	6.7 km	No mention of goshawk in Environmental Statement.
Dalswinton Wind Farm	Operational	0.6 km	No mention of goshawk in Environmental Statement.
Daer Wind Farm	In planning	9.6 km	Low level of flight activity, ultimately scoped out of assessment

9.7.5. Assessment of Cumulative Effects to Goshawk

9.7.5.1. Habitat Loss

Nest Sites

159. A goshawk territory was only recorded at one of the three windfarm sites (Harestanes Windfarm) identified in the cumulative assessment (see **Table 9.11**), and this territory was on the periphery of this site. Therefore, there is not predicted to be any cumulative loss of goshawk nesting sites (**no effect**).

Foraging Habitat

160. With regards to foraging habitat, the proposed Development represents an increase in turbines west of Harestanes Windfarm, the one site where goshawk was recorded in the relevant search area. The proposed Development therefore increases the potential loss of foraging habitat. 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 available habitat within the wider area. The area of potential foraging habitat lost would be even less when considered in relation to the available foraging habitat surrounding each site. Even though the Site is of regional value to the goshawk population, any cumulative loss of goshawk foraging habitat would result in a **negligible cumulative effect** (i.e. 'Not Significant').

9.7.5.2. Disturbance/Displacement

161. Based on the data available, the goshawk territories that would be potentially affected by disturbance/displacement are the territories in proximity to the 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 development 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 200 m of the turbines.

162. 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 **minor adverse**, which is 'Not Significant' in terms of the EIA Regulations.

9.7.5.3. Cumulative Collision Mortality

163. Only one other site identified a potential collision mortality effect on the goshawk population: Harestanes South. The collision risk assessment for this development predicted 0.300 collision related deaths per year. This would result in 0.744 collisions predicted per year as result of both developments, less than 1% of the regional population per year (0.744).

164. With regards to how this compares to natural mortality rates, this equates to 19.5-27.3 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. one



death every 1.3 years). This equates to an increase of 3.66-6.66% of the natural adult mortality rate²⁴. Given that natural mortality of 15-21% in adults has still resulted in a 241% increase in the goshawk population over the last 25 years (Eaton and the RBBP, 2024), when windfarms have proliferated across Scotland, many in forested upland habitats inhabited by goshawks, it is considered that any increase in mortality is likely to have a small effect on the population.

165. 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 regional (and national) population, compared to the background mortality rates. As such, at most the cumulative effect is predicted to be **minor adverse**, which is '**Not Significant**' in terms of the EIA Regulations.

9.7.5.4. Cumulative Barrier Effects

166. 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.
167. 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. Although the Site is potentially regionally important for this species, it is predicted to result in a **minor adverse cumulative effect**, which is '**Not Significant**' in terms of the EIA Regulations.

9.8. Mitigation

168. Whilst the above impact assessment does not predict any effects of a level greater than minor adverse (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 herein.

9.8.1.1. Pre-Construction

169. Prior to the commencement of felling and construction works, pre-construction Schedule 1 listed raptor/owl surveys of the Application Boundary and a surrounding buffer of at least 1km would be carried out, focussing largely on goshawk but also species known to breed in the vicinity such as barn owl, short-eared owl and red kite. The surveys would broadly follow the methods detailed in Hardey *et al.* (2013) and would involve a combination of watches followed by walkovers of the forest (and outbuildings) to identify active nest site locations.
170. The watches would be carried out in the late winter/early spring months when goshawks engage in display flight activity and observations at this time can help to target certain areas during the forest searches. A detailed survey protocol would be prepared and

²⁴ It is understood that not all collision related deaths would be adults but also sub-adults and more likely inexperienced juveniles.



agreed with NatureScot prior to the commencement of surveys to ensure appropriate intensity and coverage by the survey.

171. 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).
172. 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/owl) nesting activity which may have taken place in the intervening years between the submission of this EIA Report and the commencement of construction works. 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.

9.8.1.2. Construction

173. The pre-construction Schedule 1 raptor/owl 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 Schedule 1 species like goshawk.
174. 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 9.6**. 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.
175. NatureScot (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.
176. 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 9.6**. The nest checks and any subsequent buffer zones would take account of disturbance distances discussed for goshawk in **Section 9.7.1.4** if goshawk nests are located.

9.8.1.3. Operation

177. Although no significant adverse effects are predicted during the operational phase of the proposed Development post-construction monitoring is proposed. A breeding goshawk survey of the proposed Development and 2 km buffer would be carried out in the year immediately after construction in order to ascertain whether there are any impacts on the distribution of the species and if territories become vacant. The extent of post-construction monitoring would be agreed with consultees and secured as a condition of the development.
178. No further mitigation is proposed at this stage however, although this may be required if any adverse impacts were realised.

9.9. Residual Effects

179. 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 minor adverse effects (i.e. Not Significant) on the regional goshawk population. **Table 9.11** details residual effects for goshawk following the implementation of the mitigation measures detailed above, which are predicted to result in slightly fewer minor adverse effects (i.e. 'Not Significant').

Table 9.11 Predicted Residual Effects to Goshawk

Development Phase	Impact	Pre-effect Significance	Mitigation	Residual Effect Significance
Construction	Habitat loss (nesting)	No effect	None	No effect
	Habitat loss (foraging)	Negligible (Not Significant)	None	Negligible (Not Significant)
	Disturbance/Displacement (nesting)	Minor adverse (Not Significant)	Surveys prior and during construction to identify active nests and inform requirement for work exclusion zones.	Negligible (Not Significant)
	Disturbance/Displacement (foraging)	Negligible (Not Significant)	None	Negligible (Not Significant)
Operation	Disturbance/Displacement (nesting)	Negligible (Not Significant)	None	Negligible (Not Significant)
	Disturbance/ Displacement (foraging)	Minor adverse (Not Significant)	None	Minor adverse (Not Significant)
	Collision with turbines	Minor adverse (Not Significant)	None	Minor adverse (Not Significant)
	Barrier Effect	Minor adverse (Not Significant)	None	Negligible (Not Significant)

9.10. Summary of Effects

Table 9.12 Summary of Effects

Species	Effect	Development Phase	Assessment Consequence	Effect Significance
<i>Goshawk</i>	Habitat loss (nesting)	Construction	<i>No Consequence</i>	<i>No effect</i>
	Habitat loss (foraging)	Construction	Negligible effect	Not Significant
	Disturbance/Displacement (nesting) (Borrow Pit Blasting)	Construction	Negligible effect	Not Significant
	Disturbance/Displacement (nesting) (Inside Breeding Season)	Construction	Minor adverse effect / Negligible effect	Not Significant / Not Significant
	Disturbance/Displacement (nesting) (Avoiding Breeding Season)	Construction	<i>No Consequence</i>	<i>No effect</i>
	Disturbance/Displacement (foraging)	Construction	Negligible effect	Not Significant
	Disturbance/Displacement (nesting)	Operation	Negligible effect	Not Significant
	Disturbance/ Displacement (foraging)	Operation	Minor adverse effect	Not Significant
	Collision with Turbines	Operation	Minor adverse effect	Not Significant
	Barrier Effect	Operation	Minor adverse effect	Not Significant

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