

9 ORNITHOLOGY

9.1 INTRODUCTION

1. This Chapter of the Environmental Impact Assessment (EIA) Report evaluates the effects of the Development on ornithological features present at the Site, including Important Ornithological Features (IOFs). This assessment was undertaken by Arcus Consultancy Services Limited (Arcus).
2. This Chapter of the EIA Report is supported by the following Technical Appendix documents provided in Volume 3 Technical Appendices:
 - Appendix A9.1: Baseline Ornithology Report 2018-19;
 - Appendix A9.2: Baseline Ornithology Report 2018-19 – Confidential Annex;
 - Appendix A9.3: Collision Risk Modelling;
 - Appendix A9.4: Ornithology Consultation Report (October 2018);
 - Appendix A9.5: Ornithology Consultation Report Update: 2019 Breeding Season; and
 - Appendix A9.6: Ornithology Consultation Report: Baseline to Date and Requirement for Further Surveys.
3. This chapter includes the following elements:
 - Legislation, Policy and Guidance;
 - Assessment Methodology and Significance Criteria;
 - Baseline Conditions;
 - Assessment of Potential Effects;
 - Cumulative Effect Assessment;
 - Mitigation, Monitoring, and Residual Effects;
 - Summary of Effects; and
 - Statement of Significance.
4. English (British) vernacular and scientific names of bird species referred to in this report follow the British List maintained by the British Ornithologists' Union (BOU)¹.

9.2 LEGISLATION, POLICY AND GUIDANCE

5. The following key legislation, planning policy, guidance, and information sources have been considered in carrying out this assessment.

9.2.1 Legislation

- Directive 2009/147/EC on the Conservation of Wild Birds ('Birds Directive')²;
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (The Habitats Regulations)³;
- The Wildlife and Countryside Act 1981 (as amended)⁴;
- The Nature Conservation (Scotland) Act 2004 (as amended)⁵;

¹ British Ornithologists' Union. (2017) The British List: A Checklist of Birds of Britain (9th edition). *Ibis* 160, 190-240.

² European Parliament (2009) Directive 2009/147/EC [Online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0147&from=EN> (Accessed 08/05/20)

³ European Parliament (1994) the Conservation (Natural Habitats, &c.) Regulations 1994 [Online] Available at: <http://www.legislation.gov.uk/ukxi/1994/2716/contents/made> (Accessed 08/05/20)

⁴ UK Government (1981) The Wildlife and Countryside Act 1981 (as amended) [Online] Available at: <http://www.legislation.gov.uk/ukpga/1981/69> (Accessed 08/05/20)

⁵ UK Government (2004) Nature Conservation (Scotland) Act 2004 [Online] Available at: <http://www.legislation.gov.uk/asp/2004/6/contents> (Accessed 08/05/20)

- Environmental Impact Assessment Directive 2014/52/EU⁶; and
- Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017⁷.

9.2.2 Planning Policy

- UK Post-2010 Biodiversity Framework (2012)⁸;
- Scottish Biodiversity Strategy: It's in Your Hands (2004)⁹/2020 Challenge for Scotland's Biodiversity (2013)¹⁰;
- PAN 60: Planning for Natural Heritage (Scottish Government 2000)¹¹;
- Scottish Government (2017). Planning Advice Note 1/2013-Environmental Impact Assessment, Revision 1.0¹²;
- South Lanarkshire Council (undated) Biodiversity Strategy 2018-2022¹³ and
- South Lanarkshire Local Development Plan (2015)¹⁴.

9.2.3 Guidance and Information

- Developing field and analytical methods to assess avian collision risk at wind farms (Band *et al.*, 2007)¹⁵;
- Scottish Raptor Monitoring Scheme Report 2018 (Challis *et al.*, 2019)¹⁶;
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018)¹⁷;
- Birds of Conservation Concern (BoCC) 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man (Eaton *et al.*, 2015)¹⁸;
- Wind Energy Developments and Natura 2000 (European Commission, 2011)¹⁹;

⁶ European Parliament (2014) Directive 2014/52/EU [Online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN> (Accessed 08/05/20)

⁷ Scottish Government (2017) the Town and Country Planning (EIA) (Scotland) Regulations [Online] Available at: <http://www.legislation.gov.uk/ssi/2017/102/contents/made> (Accessed 08/05/20)

⁸ Four Countries' Biodiversity Group (2010) UK Post-2010 Biodiversity Framework [Online] Available at: <http://data.jncc.gov.uk/data/587024ff-864f-4d1d-a669-f38cb448abdc/UK-Post2010-Biodiversity-Framework-2012.pdf> (Accessed 08/05/20)

⁹ Scottish Executive (2004) Scotland's Biodiversity It's in your Hands [Online] Available at: <https://www.webarchive.org.uk/wayback/archive/20180515152802/http://www.gov.scot/Publications/2004/05/19366/37250> (Accessed 08/05/20)

¹⁰ Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity [Online] Available at: <https://www2.gov.scot/Resource/0042/00425276.pdf> (Accessed 08/05/20)

¹¹ Scottish Government (2000) PAN 60: Planning for Natural Heritage [Online] Available at: <https://www2.gov.scot/Publications/2000/08/pan60-root/pan60> (Accessed 08/05/2020)

¹² Scottish Government (2013) PAN 1/2013: EIA [Online] Available at: <https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/> (Accessed 08/01/2020)

¹³ South Lanarkshire Council (undated) Biodiversity Strategy 2018-2022 https://www.southlanarkshire.gov.uk/downloads/file/1191/biodiversity_strategy_2018_-_2022 (Accessed 31/08/2020)

¹⁴ South Lanarkshire Council (2015) South Lanarkshire Local Development Plan [Online] Available at: https://www.southlanarkshire.gov.uk/downloads/file/7600/south_lanarkshire_local_development_plan_proposed_may_2013 (Accessed 08/01/2020)

¹⁵ Band, W., Madders, M. & Whitfield, D.P. (2007) *Developing field and analytical methods to assess avian collision risk at wind farms*. In de Lucas, M., Janss, G. & Ferrer, M. (eds.) *Birds and Wind Power*. Quercus, Madrid.

¹⁶ Challis, A., Eaton, M., Wilson, M.W., Holling, M., Stevenson, A. & Stirling-Aird, P. (2019). *Scottish Raptor Monitoring Scheme Report 2018*. BTO Scotland, Stirling.

¹⁷ CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

¹⁸ Eaton M.A., Aebischer N.J., Brown A.F., Hearn R.D., Lock L., Musgrove A.J., Noble D.G., Stroud D.A. and Gregory R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708–746.

¹⁹ European Commission (2011). *Natura 2000 Guidance Document 'Wind Energy Developments and Natura 2000'*. European Commission, Brussels.

- The Birds of Scotland (Forrester *et al.*, 2007)²⁰.
 - Bird Monitoring Methods (Gilbert *et al.*, 1998)²¹;
 - Raptors: a field guide to survey and monitoring, 3rd edition (Hardey *et al.*, 2013)²²;
 - A Review of Disturbance Distances in Selected Bird Species (Ruddock & Whitfield, 2007)²³;
 - The Scottish Biodiversity List (SBL)²⁴;
 - Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action. (NatureScot (NS)²⁵, 2000)²⁶;
 - Recommended bird survey methods to inform impact assessment of onshore wind farms (NS, 2017)²⁷;
 - Assessing connectivity with Special Protection Areas (SPAs) (NS, 2016a)²⁸;
 - Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees (NS, 2016b)²⁹;
 - Wind farm proposals on afforested sites – advice on reducing suitability for hen harrier, merlin and short-eared owl (NS, 2016c)³⁰;
 - Assessing significance of impacts from onshore wind farms on birds outwith designated areas (NS, 2018a)³¹;
 - Assessing the cumulative impacts of onshore wind farms on birds (NS, 2018b)³²;
 - Environmental Impact Assessment Handbook (NS, 2018c)³³;
 - Natural Heritage Zone Bird Population Estimates (Wilson *et al.*, 2015)³⁴.
6. Note that additional sources of information used only occasionally are referenced in the text where relevant.

9.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

9.3.1 Scoping Responses and Consultations

7. Consultation for this EIA Report topic was undertaken with the organisations shown in Table 9.1.

²⁰ Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C., & Grundy, D.S. (eds) (2007) *The Birds of Scotland*. The Scottish Ornithologists Club, Aberlady.

²¹ Gilbert, G., Gibbons, D.W. & Evans, J. 1998. *Bird monitoring methods*. RSPB, Sandy.

²² Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*, 3rd edition. The Stationery Office, Edinburgh

²³ Ruddock, M. & Whitfield, D.P. 2007). *A Review of Disturbance Distances in Selected Bird Species*. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage

²⁴ <https://www.webarchive.org.uk/wayback/archive/20160402063428/http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL>

²⁵ Note that Scottish Natural Heritage changed their name to NatureScot on 24/08/2020, and throughout this document are referred to by this name rather than SNH, which was current at the time consultation with this agency (detailed in Table 1.1) took place.

²⁶ NatureScot (NS) (2000). Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action. NS Guidance Note.

²⁷ NS (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms*, Version 2.

²⁸ NS (2016a). *Assessing connectivity with Special Protection Areas (SPAs)*, Version 3.

²⁹ NS (2016b). *Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees*, Version 2.

³⁰ NS (2016c). *Wind farm proposals on afforested sites – advice on reducing suitability for hen harrier, merlin and short-eared owl*.

³¹ NS (2018a). *Assessing significance of impacts from onshore wind farms on birds outwith designated areas*, Version 2.

³² NS (2018b). *Assessing the cumulative impacts of onshore wind farms on birds*. NS Guidance Note.

³³ NS (2018c). *Environmental Impact Assessment Handbook – Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*.

³⁴ Wilson, M.W., Austin, G.E., Gillings S. & Wernham, C.V. (2015) *Natural Heritage Zone Bird Population Estimates*. SWBSG Commissioned report number SWBSG_1504.

8. A series of consultation documents (Appendices A9.4-9.6) were sent by Arcus to NatureScot (NS), formerly Scottish Natural Heritage²⁵, during ornithological surveys, in part to discuss ornithological sensitivities at the Site and the proposed survey scope. Consultation reports sent were as follows:
- Appendix A9.4: Ornithology Consultation Report (October 2018);
 - Appendix A9.5: Ornithology Consultation Report Update (January 2019); and
 - Appendix A9.6: Ornithology Consultation Report: Baseline to Date and Requirement for Further Surveys (March 2019).
9. NS confirmed that potential impacts on statutory sites could be scoped out and an Appropriate Assessment is not required. Responses to key issues are summarised in Table 9.1; and detailed responses can be viewed in the relevant consultation reports.
10. A Scoping Request³⁵ was submitted to the Scottish Government's Energy Consents Unit (ECU) in December 2019. The Royal Society for the Protection of Birds (RSPB) were consulted during the scoping process. NS had no further comments regarding ornithology in their scoping response dated 31/01/2020. No comments regarding ornithology were received from South Lanarkshire or West Lothian Councils.

Table 9.1 Consultation Responses

Consultee	Type and Date	Summary of Consultation Response (and date received)
NS	Response to consultation report, 01/01/2019	Requested that targeted long-eared owl (<i>Asio otus</i>) surveys are included within the survey scope, owing to the historical records of this species on Site.
	Response to consultation report, 01/03/2019	Confirmed that targeted surveys for crossbill (<i>Loxia curvirostra</i>) were not required, and that pre-construction surveys for this species would be sufficient.
	Response to consultation report, 14/05/2019	Confirmed that they were content that connectivity to Westwater SPA and Slamannan Plateau SPA is unlikely, and that another season of winter surveys was not required based on the results to date.
RSPB	Scoping Response, 31/01/2020	<p>Agreed with the method proposed for assessing impacts to ornithology as outlined in the Scoping Report. Advised that, based on survey results presented in the Scoping Report, scoped in species should include breeding waders, raptors (including long-eared owl) and geese.</p> <p>Agreed with the conclusion, based on survey data, that the need for an Appropriate Assessment has been scoped out.</p> <p>Agreed that all statutory sites designated for ornithological interests located beyond 20 km of the Site boundary would be scoped out of the assessment³⁶.</p> <p>Agreed that, where sensitive bird species are recorded making only occasional use of the Site, these can be scoped out. Also agreed that species that are not found to be breeding or roosting within the relevant survey areas can be scoped out, but clarified that species recorded at significant levels (foraging, breeding or roosting) within survey areas should be scoped into the assessment.</p>

³⁵ Arcus (2019) Heathland Wind Farm - Scoping Request

³⁶ Additionally, impacts on designated sites within 20 km were scoped out based on NS advice as outlined in Table 9.1

11. Relevant advice in Table 9.1 was taken into account when completing the surveys and subsequent impact assessment.

9.3.2 Scope of Assessment

12. The key issues for the assessment of potential ornithological effects relating to the Development are:
 - Direct loss of breeding, foraging and/or roosting habitat through construction of the Development;
 - Habitat modification due to change in land cover (forestry removal by keyholing) and consequent effects on bird populations and activity;
 - Displacement of birds through direct and indirect loss of habitat as a result of disturbance associated with construction or decommissioning activity, turbine operation and maintenance, or visitor disturbance;
 - Death or injury through collision with turbine blades or other types of infrastructure associated with the Development; and
 - Cumulative effects on Natural Heritage Zone (NHZ) populations, resulting from construction, operation and decommissioning of the Development in conjunction with other developments that may also impact on the same populations.

9.3.3 Elements Scoped Out of Assessment

13. Bird species considered to be of local importance (see Sections 9.5.2) have been scoped out of the assessment. As no black grouse (*Lyrurus tetrix*) were recorded during the Baseline Ornithology Surveys and no records of this species were identified during the Desk Study, this species was also scoped out of the assessment. Embedded mitigation (described in Section 9.3.10) will be implemented to ensure that all breeding bird species, including those of local importance, are protected.
14. As outlined in Table 9.1, impacts on designated sites outwith 20 km were scoped out based on NS and RSPB consultation.
15. As detailed in Section 9.4.1, two statutory sites were identified during the Desk Study: Westwater SPA, Ramsar site and Site of Special Scientific Interest (SSSI); and Slamannan Plateau SPA. Although the distance between the Site and Westwater is within the core foraging range of pink-footed goose (*Anser brachyrhynchus*; 15 km -20 km²⁸), which is a cited interest of this statutory site, the Site is not located in the core foraging areas used by pink-footed goose roosting at this SPA³⁷. Although NS guidance on potential connectivity with SPAs²⁸ does not include the core foraging range of taiga bean goose (*Anser fabalis*), which is the cited interest of the Slamannan Plateau SPA, birds from the SPA feed mainly at the western end of the Slamannan Plateau area, around Beam and Tippetcraig³⁸. Data from the 2018/19 Targeted Goose Surveys corresponds with the findings identified by the earlier 2016 Environmental Statement³⁹, that there is no connectivity between either Westwater SPA or Slamannan Plateau SPA. As detailed in Section 9.3.1, NS agreed (via email correspondence dated 14/05/2019) that they were content that connectivity to both SPAs was unlikely. It is therefore considered that an Appropriate Assessment is not required for either of these statutory sites and they have therefore been scoped out of the ornithological impact assessment.

³⁷ Mitchell, C. (2012). *Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland*. Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge.

³⁸ Hearn, RD. 2004. *Bean Goose Anser fabalis in Britain and Ireland 1960/61 – 1999/2000*. Waterbird Review Series, The Wildfowl & Wetlands Trust/Joint Nature Conservation Committee, Slimbridge.

³⁹ Partnerships for Renewables. (2016). *Heathland Wind Farm Environmental Statement*. Planning application reference CL/16/0049. Available on the South Lanarkshire Council planning application search page: <https://publicaccess.southlanarkshire.gov.uk/online-applications/>

16. As noted in Section 9.5.1.2, potential barrier effects on IOFs were also scoped out of the assessment.

9.3.4 Study Area / Survey Area

17. The Ornithology Survey Areas are defined in Section 9.10 and shown in Figure 9.1.1 of Appendix A9.1.

9.3.5 Desk Study Methods

18. A Desk Study was undertaken to provide information on the ornithological interest of the Site and its surrounds. This included identifying statutory sites designated for ornithological interests with potential connectivity to the Site and existing records of ornithological features.

9.3.5.1 Statutory Sites

19. A search was completed for the following statutory protected nature conservation sites designated for ornithological features:
 - Sites of international importance (SPAs and Ramsar sites) within 20 km of the Site; and
 - Sites of national importance (SSSIs and National Nature Reserves [NNRs]) within 10 km of the Site.
20. Information on statutory designated sites was obtained from the NS SiteLink⁴⁰ website.

9.3.5.2 Existing Records

21. Ornithology surveys were carried out at the Site between 2012 and 2014 to inform the 2016 Environmental Statement as follows:
 - Flight Activity Surveys (FAS);
 - Winter Walkover (WVO) Surveys;
 - Black Grouse Surveys;
 - Moorland Breeding Bird Surveys (MBBS);
 - Crossbill Surveys;
 - Breeding Raptor Surveys; and
 - Long-eared Owl Surveys.
22. Although the 2012-14 data was not used to inform the ornithological impact assessment, the results of previous surveys were used to refine the scope of 2018/19 ornithology surveys, and provided useful contextual information.
23. A request for the following data, recorded within 2 km of the Site in the last ten years, was made to the RSPB in July 2020:
 - All protected bird species (i.e. species listed on Schedule 1 of the Wildlife and Countryside Act 1981⁴ (as amended) and/or Annex I of the Birds Directive², including locations of nest/roost sites where possible;
 - Red-listed and Amber-listed species¹⁸, including recording period (breeding or non-breeding season) and breeding status if known;
 - Scottish Biodiversity List (SBL) species; and
 - Local Biodiversity Action Plan (LBAP)¹³ priority species.

9.3.5.3 Grid Connection

24. A high-level desk study was undertaken to assess the potential impacts on ornithological receptors associated with a grid connection between the Site and Wishaw, approximately 16 km in length. This desk-study involved use of NS SiteLink⁴⁰ and aerial imagery to

⁴⁰ Nature.Scot: Site Link [online] Available at: <https://sitelink.nature.scot/home> [Accessed 31/07/2020]

determine any statutory designated sites and high-value habitats present between the Site and Wishaw.

9.3.6 Baseline Survey Methodology

25. Baseline Ornithology Surveys were completed over a year-long period between September 2018 and August 2019 (inclusive), and followed NS guidance²⁷. Full details of ornithology survey methods are given in Appendix A9.1.
26. During each survey, signs and observations of the relevant species were recorded in the field on large scale maps. An overview of the methods followed for each survey is provided below; further details are included in Appendix A9.1.

9.3.6.1 Flight Activity Surveys

27. Flight Activity Surveys (FAS) were carried out between September 2018 and August 2019, using a series of watches from five VPs overlooking the Site, to record flight activity of target bird species and allow collision risk to be estimated.

VP Locations

28. The VP locations used during the FAS are shown in Figure 9.1.2. The viewshed (visible area from each VP) analysis was re-run to take into account the RSH of the candidate turbines; revised viewsheds are included in Figure 9.1.2 and show that VPs gave good coverage of the Site.

Target Species

29. Target species included the following:
 - All wild swan, goose and duck species;
 - All raptors and owls listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and/or Annex I of the Birds Directive²;
 - All wader species; and
 - Black grouse.
30. In accordance with NS guidance²⁷, flight lines of all target species passing through the VP viewshed (see below) were mapped in the field. Each recorded flight line was numbered and cross-referenced to the following flight information, which was recorded on standardised survey forms:
 - Species, age and sex (where identification of age/sex was possible);
 - Number of birds;
 - Time (when first seen);
 - Duration of flight within the viewshed; and
 - Flight height on detection and at 15 second intervals, recorded in the following height bands:
 1. <20 m;
 2. 20 m to <150 m;
 3. 150 m <200 m; and
 4. >200 m.

Secondary Species

31. In addition to recording target species flights, the number and activity of 'secondary' species was summarised every five minutes during each FAS. Secondary species included the following: cormorant (*Phalacrocorax carbo*), sparrowhawk (*Accipiter nisus*), buzzard (*Buteo buteo*), tawny owl (*Strix aluco*), kestrel (*Falco tinnunculus*), all gull species and raven (*Corvus corax*). Recording of target species took priority over that of secondary species.

Survey Details

32. Surveys were stratified to cover all times of day including dawn and dusk periods. Each watch generally lasted three hours with a 30-minute break in between watches; however, some surveys were cut short due to inclement weather. During the 2018/19 non-breeding season a minimum of 48 hours survey was conducted from each VP, while during the 2019 breeding season 42 hours was carried out from each VP, exceeding the minimum recommendation of 36 hours of survey from each VP in each season²⁷.

9.3.6.2 Foraging Goose Surveys

33. Foraging Goose Surveys were undertaken between late September 2018 and May 2019 (inclusive) to assess use of the Site and a 500 m Buffer Area (access permitting) by foraging geese. The surveys involved the surveyor driving or walking the Survey Area and stopping regularly to scan visually for birds using binoculars and/or a telescope.

9.3.6.3 Goose Roost Surveys

34. Two two-hour VP surveys per month were completed at Cobbinshaw Reservoir (to the east of the Site) between September 2018 and May 2019 (inclusive) around the hours of dawn and dusk, to identify whether it was used by roosting geese. The VP location is shown on Figure 9.1.2, Appendix A9.1.

9.3.6.4 Black Grouse Surveys

35. Black Grouse Surveys were completed between late March and late April 2019, based on standard methods²¹. Surveys covered all potentially suitable lekking habitat within the Site Boundary and a surrounding 1.5 km Buffer Area (access permitting).

9.3.6.5 Breeding Raptor Surveys

36. In line with NS guidance²⁷, walkover surveys and additional VP watches of suitable areas of breeding habitat were undertaken between mid-March and early August 2019 (inclusive) to detect the presence of target raptor species (including owls). Surveys followed standard methods²² and the Survey Area comprised suitable habitat in accessible areas within 1 km of the Site Boundary for barn owl (*Tyto alba*) and goshawk, and within 2 km for all other raptor species (access permitting).

9.3.6.6 Long-eared Owl Surveys

37. Long-eared owl (*Asio otus*) were confirmed to be breeding within the Site during the 2013 and 2014 baseline surveys. During 2019, targeted surveys for breeding long-eared owl were undertaken within 1 km of the Site Boundary (access permitting), following standard survey guidance for this species²². This involved four visits to the Site between March and July 2019 (inclusive), between dusk and two hours after sunset, with surveyors using playback of long-eared owl calls at listening points, to determine presence of any breeding pairs. Surveyors recorded vocalisations (including wing-clapping) and sightings which were used to determine whether any territories were present within the Survey Area.

9.3.6.7 Moorland Breeding Bird Surveys

38. A MBBS was undertaken between April and July 2019 (inclusive) to identify breeding wader territories. In line with NS guidance²⁷, the survey followed an adapted Brown and Shepherd (1993) method (designed to census upland breeding waders) and the Survey Area covered areas of open moorland within the Site and a surrounding 500 m Survey Buffer (shown in Figure 9.1.1, Appendix A9.1). Four survey visits were completed, at least seven days apart.

9.3.7 Collision Risk Modelling Methodology

39. The CRM methods were based on the Band *et al.* (2007)¹⁵ Collision Risk Model. Data collected during the 2018-19 FAS were used to predict the number of individuals per species expected to collide with the turbine rotors. FAS height band 2 (20 m-150 m) falls entirely within the RSH of both turbine models, while height bands 1 (<20 m) and 3 (150 m -200 m) also partly overlap the RSH of the smaller and larger turbine models respectively. Therefore, a 'worst-case scenario' approach was adopted and all target species flights recorded within height bands 1-3 that passed within the Collision Risk Zone were considered to be at potential risk of collision and included in the CRM (where sufficient flight activity was recorded)⁴¹.
40. FAS completed from VP 1 (covering open moorland to the east of the Site) and flights recorded during them was scoped out of CRM as this area is outwith the Site Boundary. Furthermore, due to the variation in habitats on Site (plantation forestry) and within the VP 1 viewshed, flight activity within the VP 1 viewshed was not considered to be representative of flight activity over the Site.
41. CRM was completed for the following five target species:
 - Greylag goose;
 - Pink-footed goose;
 - Goshawk;
 - Golden plover (*Pluvialis apricaria*), and;
 - Peregrine (*Falco peregrinus*).
42. All other target species listed in the NS guidance³¹ as 'Priority Species for Assessment' or as qualifying species of statutory designed sites listed in Table 9.5 were scoped out due to very low levels of flight activity⁴¹ within the CRZ.
43. Full details of CRM are provided in Appendix TA9.3.

9.3.8 Methodology for the Assessment of Effects

44. The approach used for the Ecological Impact Assessment (EcIA) process is in line with guidance produced by CIEEM¹⁷ and NS³³, and comprises the following stages:
 - Evaluation of the importance of ornithological features through Desk Study and Baseline Ornithology Surveys – those considered to be IOFs⁴² are scoped into the assessment, while species considered to be of local importance are scoped out;
 - Identification and characterisation of potential effects on IOFs;
 - Assessment of potential effects on IOFs, both from the Development alone and in combination with other developments in the surrounding area (cumulative effects);
 - Identification of any measures required to avoid and mitigate (reduce) these effects; and
 - Assessment of the significance of any residual effects after mitigation.
45. Further details relating to the methods used for evaluating the importance of ornithological features, characterising potential impacts, and assessing the significance of residual effects are provided below.

9.3.8.1 Sensitivity of Receptors

46. Ornithological features can be important for a variety of reasons and may relate, for example, to statutory designations (for protected sites), or (for species) to rarity, the extent to which they are threatened throughout their range, or to their rate of decline.

⁴¹ Defined as species with fewer than three flights or 10 individuals recorded within the CRZ.

⁴² CIEEM guidance¹⁷ recommends defining Important Ecological Features (IEFs), but for the purpose of this chapter, IEFs will be referred to as IOFs since only avian species are considered.

47. The level of importance of ornithological features identified during the Desk Study and Baseline Ornithology Surveys has been determined using the criteria defined in Table 9.2. These criteria have been determined with reference to CIEEM guidance¹⁷. For protected sites, this includes a consideration of statutory designations and relevant legislation, as well as potential connectivity to the Site. For species, this includes a consideration of relevant legislation, conservation status, population size and distribution, level and type of Site use and, where not a designated feature of an SPA or Ramsar site (with potential connectivity to the Site), whether the species is identified in NS guidance³¹ as a priority for assessment when considering the development of onshore wind farms in Scotland.
48. Note that, in some cases, information relating to the size (and distribution) of local and regional populations can be limited or unavailable. Where this is the case and it is not clear whether a population is present in locally versus regionally (or regionally versus nationally) important numbers, a precautionary approach is used and the population is assessed as being of the higher level of importance.
49. In addition to the importance of each bird species in terms of relevant legislation and conservation listings, the evaluation of species importance levels also considers the value of the Site and immediate surroundings for that species, in terms of the number of individuals using it and the nature and level of use. For example, if one or more pairs of birds listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended)⁴ was found to be breeding within the Site, the species would likely be assigned a regional or higher importance level (depending on population status and trends). However, if 1–2 Schedule 1 birds flew across the Site very occasionally, and the species was not considered to be using it regularly⁴³, it would likely be assessed as being of low importance. Similarly, for protected sites, in addition to the statutory designations, the potential for connectivity with the Site is taken into account when determining its importance in the context of the assessment. Thus, a statutory site identified during the Desk Study and designated as being of national or higher importance, but with no potential connectivity to the Site, would likely be evaluated as being of no more than local importance in the context of the assessment, because there is no pathway for the Development to have an effect.

Table 9.2 Framework for Determining Importance of Ornithological Receptors

Importance of Receptor	Examples
International	<ul style="list-style-type: none"> • Statutory sites of international ornithological importance (SPAs and Ramsar sites) with potential connectivity to the Site. • The regular presence⁴³ within or around the Site of a cited interest of an existing or proposed statutory site of international ornithological importance, i.e. SPA or Ramsar site, with potential connectivity to the Site. Cited means mentioned in the citation text for the protected site as a species for which the site is designated. Numbers of birds making use of the Site and/or surrounding area are also taken into account. • The regular presence⁴³ within or around the Site of other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site (such as part of an assemblage where this is a designated feature), where there is potential connectivity with the Site. Numbers of birds making use of the Site and/or surrounding area are also taken into account.
National (Scotland)	<ul style="list-style-type: none"> • Statutory sites of national ornithological importance (SSSIs and NNRs) with potential connectivity to the Site. • The regular presence⁴³ within or around the Site of a designated feature of an existing or proposed statutory site of national ornithological

⁴³ Regular presence is based on professional judgement but is broadly defined as breeding, or more than occasional commuting, foraging or roosting

Importance of Receptor	Examples
	<p>importance, i.e. SSSI or NNR, with potential connectivity to the Site. Numbers of birds making use of the Site and/or surrounding area are also taken into account.</p> <ul style="list-style-type: none"> • The regular presence⁴³ within or around the Site of a species listed on Annex I of the Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), where the species is not a cited interest of a statutory site of international ornithological importance, but is present in nationally important numbers. • The regular presence⁴³ within or around the Site of nationally important numbers of a species of conservation concern⁴⁴, where this is identified in NS guidance³¹ as a priority for assessment. • The regular presence⁴³ within or around the Site of nationally important numbers of a migratory species which is either rare or vulnerable, or warrants special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas to a proposed development, and which is identified in NS guidance³¹ as a priority for assessment.
Regional	<ul style="list-style-type: none"> • A cited interest of an existing or proposed SPA or Ramsar site, with potential connectivity to the Site, which is present within or around the Site infrequently or in relatively low numbers, but could use the Site more regularly post-construction. • Other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site, with potential connectivity to the Site, which is present within or around the Site infrequently or in low numbers, but could use the Site more regularly post-construction. • Other species listed on Annex I of the Birds Directive, or breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), that are present within or around the Site infrequently or in low numbers (regionally or locally important numbers), but could use the Site more regularly post-construction. • A regionally (i.e. at the NHZ scale) important population/assemblage of a species of conservation concern⁴⁴ that regularly occurs within or around the Site, where this is identified in NS guidance³¹ as a priority for assessment.
Local	<ul style="list-style-type: none"> • Statutory sites of international or national ornithological importance (SPAs, Ramsar sites, SSSIs and NNRs) with no potential connectivity to the Site. • Sites of local ornithological importance (e.g. Local Nature Reserves (LNRs)). • A cited interest of an existing or proposed SPA or Ramsar site, with potential connectivity to the Site, but which is present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction. • Other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site, with potential connectivity to the Site, but which are present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction. • Other species listed on Annex I of the Birds Directive, or breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), that are present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction

⁴⁴ An SBL priority species or Red/Amber-listed BoCC

Importance of Receptor	Examples
	<ul style="list-style-type: none"> • Other species identified in NS guidance³¹ as a priority for assessment, but which are present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction. • A locally important population/assemblage of a species of conservation concern⁴⁴ that regularly occurs within or around the Site, but is not identified in NS guidance³¹ as a priority for assessment and is unlikely to be at significant risk of impact from the Development.
Less than Local	<ul style="list-style-type: none"> • All other species that are widespread and common and of low conservation concern (e.g. included on the UK BoCC Green-list) and which are not present in locally important (or greater) numbers.

9.3.8.2 Identifying and Characterising Potential Effects

50. In line with the CIEEM EcIA guidance¹⁷ where possible, consideration is given to the following characteristics when identifying potential effects of the Development on IOFs:

- **Nature of effect:** whether it is positive (beneficial) to the IOF, e.g. by increasing species diversity or extending habitat, or negative (detrimental), e.g. by loss of, or displacement from, suitable habitat;
- **Extent:** the spatial or geographical area over which the effect may occur;
- **Magnitude:** the size, amount, intensity, and volume of the effect;
- **Duration:** the duration of an effect as defined in relation to IOF characteristics (such as a species' life cycle) as well as human timeframes. It should also be noted that the duration of an activity may differ from the duration of the resulting effect; e.g. if short-term construction activities cause disturbance to breeding birds, there may be long-term implications from failure to reproduce that season;
- **Frequency:** the number of times an activity occurs may influence the resulting effect;
- **Timing:** this may result in an impact on an IOF if it coincides with critical life stages or seasons (e.g. the breeding season); and
- **Reversibility:** a reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation (within a reasonable timescale).

51. The criteria for assessing the magnitude of a potential effect are presented in Table 9.3.

Table 9.3 Framework for Determining Magnitude of Potential Effects

Magnitude of Effects	Definition
High	A fundamental change to the baseline condition of the IOF, leading to total loss or major alteration of the relevant population.
Medium	A material change to the baseline condition of the IOF, leading to partial loss or alteration of the relevant population.
Low	A slight, detectable, alteration of the baseline condition of the IOF.
Negligible	A barely distinguishable change from baseline conditions.

9.3.8.3 Significance of Effect

52. The latest CIEEM EcIA guidance¹⁷ avoids and discourages use of the matrix approach to determine significance, and describes only two categories: 'significant' or 'not significant'.

53. According to the CIEEM guidance, for the purpose of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for important ecological features (which in this case would be IOFs) or for biodiversity in general.

54. NS guidance (2018a)³¹ refers to maintaining the favourable conservation status of a bird species (or not affecting its recovery) when assessing the significance of any wind farm impact. Conservation status is defined in this guidance as:

"The sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest (which for the purposes of the Birds Directive is the EU)".

55. Conservation status is considered to be "favourable" under the following circumstances:
- *"population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;*
 - *the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and*
 - *there is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis".*

56. Effects can be considered significant at a wide range of scales from international to local. NS (2018a)³¹ 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".

57. Thus,

"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."

58. As potential connectivity to designated sites has been scoped out, in agreement with NS, no species have been assessed in the context of potential effects on the conservation status of designated site populations. For all species, the most relevant scale for assessment of significant effects on conservation status of breeding populations is considered to be the appropriate NHZ.

The Site is located within the east of NHZ 17 (West Central Belt)³⁴. For wintering or migratory species that are not designated features of statutory sites, there is limited information on NHZ populations; in this situation effects on the conservation status of the Scottish population have been considered when determining whether potential effects are likely to be significant.

59. In this assessment, all effects that could threaten the integrity of a statutory site designated for ornithological features or the favourable conservation status of a population have been scoped out.
60. The assessment has been undertaken assuming a micro-siting allowance of 100 m.

9.3.9 Assessment Limitations

61. Minor limitations to the Baseline Ornithology Surveys are detailed in Appendix A9.1, but are not considered to have affected the robustness of the assessment.

9.3.10 Embedded Mitigation

62. Ornithological features have been considered at all stages of the Development design, from initial feasibility to final layout. Standard good practice measures will also be implemented during construction (including felling, where this takes place prior to other construction works) to ensure compliance with relevant legislation protecting all breeding wild birds. This has helped to avoid or greatly reduce impacts on IOFs and other ornithological features. The key embedded mitigation with relevance to ornithological

features is the implementation of a Breeding Bird Protection Plan (BBPP), as outlined below, to protect breeding birds.

63. Subsequent sections of this chapter assume that the embedded mitigation described below will be fully implemented.
64. Under the Wildlife and Countryside Act 1981 (as amended)⁴ it is an offence to kill or injure any bird, or to damage or destroy nests and eggs. Breeding species listed on Schedule 1 of the Act are afforded additional protection, and there was some evidence of goshawk (which is a Schedule 1 species) establishing breeding territories within the Site (see Appendix A8.2). A BBPP will be developed to detail good practice measures aimed at ensuring the safeguarding of breeding birds and legislative compliance during all phases of the Development. Proposed measures are outlined below. Note that felling of the plantation on Site is considered to be a component of the construction works.

Construction Phase

65. **Timing of works:** where possible, construction works will take place outside the main breeding bird season (March to August inclusive).
66. **Pre-construction survey for breeding goshawk:** goshawk is a historic breeder within the Site, and there were two probable territories present during 2019 Baseline Ornithology Surveys (further details in Confidential Appendix A9.2). NS have defined the breeding season for this species as mid-March to mid-August⁴⁵. As felling is required, precautions must be taken to avoid potential disturbance to nesting birds or destruction of active nests. A pre-construction survey of areas of suitable habitat for nesting goshawk within 500 m of works will be completed ahead of any operations, regardless of the time of year, by a suitably experienced and licensed Ecological Clerk of Works (ECoW), to check for active nests (or other evidence of breeding).
67. **Pre-construction survey for breeding crossbill:** crossbill has a protracted breeding season, which NS have defined as January to mid-December⁴⁵. Prior to any felling, precautions must be taken to avoid potential disturbance to nesting birds or destruction of active nests. A pre-construction survey of areas of suitable habitat for nesting crossbill within 150 m of works will be completed ahead of any operations, including felling, regardless of the time of year, by a suitably experienced and licensed ECoW, to check for evidence of breeding (such as active nests or territorial behaviour).
68. If breeding crossbill are recorded within 150 m of works, the ECoW will ensure that any active nests are not destroyed, and that there is no disturbance to nesting crossbill. This may include temporary cessation of works within a determined exclusion zone until all dependent young have fledged. NS will be consulted with to refine mitigation measures.
69. **Pre-construction survey for other breeding birds:** where construction works are required during the breeding bird season (March to August inclusive), the area within 500 m of works will be surveyed ahead of any operations, by a suitably experienced and qualified ECoW, to check for active nests of all bird species.
70. **Toolbox talk:** a 'toolbox talk' will be delivered by a suitably experienced ECoW to ensure that all contractors working on the Development are aware of ornithological sensitivities and relevant legislation.
71. **Protection of nesting birds:** if any nests (or breeding territories of Schedule 1 species) are identified during pre-construction surveys, an exclusion zone around the nest/breeding territory will be established (with the distance appropriate to the species and agreed through consultation with NS⁴⁶). No works will be permitted within the

⁴⁵ <https://www.nature.scot/sites/default/files/2017-07/A303080%20-%20Bird%20Breeding%20Season%20Dates%20in%20Scotland.pdf> [Accessed 04/08/20]

⁴⁶ For Schedule 1 species, the exclusion zone will be agreed with NS.

exclusion zone and no personnel or vehicles will be allowed to enter or pass through until the ECoW has confirmed that the chicks have fledged or the breeding attempt has failed.

72. Where this is not feasible, NS will be contacted and further mitigation measures agreed to ensure that nesting birds are not disturbed.
73. **Minimising disturbance from Site vehicles:** where construction works are required during the breeding bird season, mitigation measures to limit the impact of vehicular disturbance will be implemented. This will include measures such as no idling of vehicles, and appropriate speed restrictions on Site.

Operational Phase

74. Routine maintenance required during operation is expected to be minimal, limited to small areas and of temporary duration. However, should significant operational works be required during the nesting bird season, or any Schedule 1 nesting birds be observed during the operational phase, it is recommended that the mitigation measures outlined above for the construction phase are implemented to protect breeding birds and ensure compliance with the relevant legislation.

Decommissioning Phase

75. As decommissioning works are likely to be of a similar nature and duration as construction activities, the mitigation outlined above for construction works should also be implemented during the decommissioning phase, in order to protect breeding birds.

9.3.11 Cumulative Effects

76. A cumulative ornithological assessment has been undertaken following NS³² guidance, and considering the favourable conservation status of populations within the relevant NHZ (NHZ 17).
77. Note that, as different projects often employ different baseline survey and impact assessment methods, data often cannot be directly compared, and so quantitative assessment of cumulative impacts and effects is often not possible. Furthermore, as there is no compulsion for developers to share commercial data with other companies, it is often impossible to acquire a full dataset. Therefore, a comprehensive and quantitative cumulative impact assessment is rarely possible. However, every effort has been made to provide a qualitative assessment that is as robust as the available data allows.

9.4 BASELINE CONDITIONS

9.4.1 Desk Study Results

9.4.1.1 Statutory Sites

78. Two statutory designated sites of international ornithological importance (one of which has multiple designations) were identified within 20 km of the Site. Details of both sites are summarised in Table 9.4.

Table 9.4 Summary of Statutory Sites Designated for Ornithological Interest Within 20 km of the Site, Listed in Order of Proximity

Site name	Designation(s)	Designated features	Description	Approximate distance to the Site*
Westwater	SPA, Ramsar site and SSSI	Pink-footed goose, non-breeding; and Waterfowl assemblage, non-breeding	Located 320 m above sea level (asl) in the Pentland Hills. The site is an artificial reservoir and supports	13.0 km to south-east

			large numbers of wintering pink-footed geese and over 20,000 wintering waterfowl ⁴⁷ .	
Slamannan Plateau	SPA	Taiga bean goose, non-breeding	Located east of Cumbernauld, in the headwaters of the River Avon. Consists of two small lochs and their surrounding peatlands and associated areas of rough and improved grassland. These habitats support roosting and feeding taiga bean geese during periods in winter ⁴⁸ .	19.5 km to north-west
*From closest point				

9.4.1.2 Existing Records of Protected Species

79. The RSPB did not hold any relevant records within the specified search area (within 2 km of the Site).

9.4.1.3 Previous Baseline Surveys and Reporting

Field Surveys

80. Previous ornithology surveys were carried out at the Site between 2012 and 2014 to inform the 2016 Environmental Statement³⁹. Key results of these surveys are summarised below:
- Pink-footed goose was the species recorded most frequently (128 flights) during the 2012-13 FAS, followed by curlew (68 flights) and goshawk (62 flights). There was also regular flight activity over the Site by a range of other target wildfowl, wader and raptor species typical of the Site location and habitats present;
 - Eleven target species were recorded during WWO Surveys. This included one Annex 1² species (golden plover) and four Schedule 1 species (brambling, crossbill, fieldfare and redwing);
 - No black grouse were recorded during targeted surveys undertaken in 2013;
 - A total of 32 species were recorded during the 2013 MBBS, of which nine are Red-listed BoCC18. Two of these species are also identified in NS guidance³¹ as priority species for assessment: curlew and lapwing. No breeding territories of any Annex I or Schedule 1 species were identified during the MBBS;
 - Twenty-three crossbills were recorded during targeted crossbill surveys undertaken in 2013;
 - Two target raptor species were recorded during the 2013 Breeding Raptor Surveys: goshawk and peregrine. An active goshawk territory was confirmed to be present within the Breeding Raptor Survey Area, from which at least one chick successfully fledged. One adult male peregrine was observed in flight, but no breeding activity

⁴⁷ NS. (2018). Citation for Special Protection Area (SPA) Westwater (UK9004251). Available online at: https://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8591 [Accessed 20/07/2020]

⁴⁸ NS. (2008). Citation for Special Protection Area (SPA) Slamannan Plateau Falkirk and North Lanarkshire (UK9004441). Available online at: https://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=9184 [Accessed 20/07/2020]

was observed. Further surveys in 2014 indicated that the same goshawk territory was occupied again that year; and

- During the targeted 2014 surveys, small numbers of long-eared owl were recorded, and it was estimated that at least three breeding territories were present.

CRM

81. Based on the results of the 2012-13 baseline FAS, CRM was carried out for five species, with the following estimated collision mortality estimates presented in the Ornithology Chapter of the 2016 Environmental Statement (ES)³⁹:

- Pink-footed goose: 11.0 birds per year, all during the non-breeding season;
- Golden plover: 3.6 birds per year, almost all during the non-breeding season;
- Goshawk: 0.60 birds per year, the majority during the breeding season;
- Greylag goose: 0.48 birds per year, all during the non-breeding season; and
- Peregrine: 0.02 birds per year, all during the breeding season.

EcIA

82. Based upon the Desk Study, baseline survey and CRM results, two bird species were scoped into the 2016 EcIA³⁹:

- Pink-footed goose; and
- Goshawk.

83. No significant effects (including cumulative effects) were predicted for either species. However, slight (non-significant) impacts on goshawk were predicted and it was proposed that best practice measures would be followed during construction to protect breeding goshawk, followed by post-construction monitoring of this species.

9.4.1.4 Grid Connection

84. The precise grid route has not been confirmed; therefore, it is not yet possible to accurately assess for potential effects on ornithological receptors along the route. However, based on a predicted 16 km route between the Development and the substation in Wishaw, the following potential constraints have been identified, based on an assessment of an overhead line:

- Ornithological species: the route dissects several different habitats (including woodland, watercourses, waterbodies, agricultural land and moorland) suitable to support Schedule 1 species, (including goshawk, merlin and peregrine), other species of conservation concern (including black grouse), notable wintering birds (geese and swan species), and common breeding birds. Therefore, baseline ornithological surveys would be undertaken to fully assess the species which could be impacted, in line with NS guidance⁴⁹; and
- Designated sites: No statutory sites designated specifically for ornithological features were identified within 2 km of the proposed grid route, however two LNRs were present which are designated in part for their ornithological interest:
 - King's Hill LNR; and
 - Greenhead Moss and Perchy Pond LNR.

85. The route would be designed to minimise effects on any ornithological constraints. This would be achieved through careful planning and avoiding disturbance to ornithological species identified during baseline surveys via mitigation methods. Potential effects on ornithological features could include:

⁴⁹ NatureScot (2009) *Assessment and Mitigation of Impacts of Power Lines and Guyed Meteorological Masts on Birds* [Accessed 27/11/20] <https://www.nature.scot/sites/default/files/2019-11/Guidance%20-%20Assessment%20and%20mitigation%20of%20impacts%20of%20power%20lines%20and%20guyed%20meteorological%20masts%20on%20birds.pdf>

- Direct loss of breeding, foraging and/or roosting habitat through construction of the Development;
 - Habitat modification due to change in land cover and consequent effects on bird populations and activity;
 - Displacement of birds through direct and indirect loss of habitat as a result of disturbance associated with construction or decommissioning activity or maintenance of the grid connection;
 - Death or injury through collision with overhead lines;
 - Death or injury through electrocution from power lines or supporting structures; and
 - Cumulative effects on Natural Heritage Zone (NHZ) populations, resulting from construction, operation and decommissioning of the Development in conjunction with other developments that may also impact on the same populations.
86. These measures will be undertaken to reduce the likelihood of any significant effects on ornithological receptors.

9.4.2 Baseline Surveys

87. Detailed Baseline Ornithology Survey results are presented in Technical Appendices A9.1 and A9.2. A summary of key results during each survey is provided below.

9.4.2.1 Flight Activity Surveys

88. A total of 356 flights by 22 identified target species and unidentified geese were recorded during the FAS. Of the target species, pink-footed goose was recorded most frequently, with 114 flights (all during the non-breeding season). Fifty-five goshawk flights (including display flights) were also recorded, as well as frequent curlew, snipe (*Gallinago gallinago*) and golden plover flights (40, 26 and 21 flights respectively). All other species were recorded infrequently, with fewer than 20 registrations of each species.
89. A summary of all target species flights, broken down by species, is provided in Table 9.5.

Table 9.5: Summary of Target Species Flights Recorded During the 2018-19 FAS

Species*	Scientific Name	Total no. of flights	No. of birds per flight	Total no. of individuals recorded
Canada goose	<i>Branta canadensis</i>	6	1-25	54
Greylag goose	<i>Anser anser</i>	18	2-30	95
Taiga bean goose	<i>Anser fabalis</i>	1	1	1
Pink-footed goose	<i>Anser brachyrhynchus</i>	114	1-1,000	7,331
Unidentified goose**	<i>Anser sp.</i>	7	1-29	90
Mute swan	<i>Cygnus olor</i>	3	1-3	6
Whooper swan	<i>Cygnus cygnus</i>	1	2	2
Mallard	<i>Anas platyrhynchos</i>	12	1-3	21
Goosander	<i>Mergus merganser</i>	1	1	1
Grey heron	<i>Ardea cinerea</i>	5	1	5
Golden eagle	<i>Aquila chrysaetos</i>	1	1	1
Goshawk	<i>Accipiter gentilis</i>	55	1-2	62
Marsh harrier	<i>Circus aeruginosus</i>	5	1	5

Species*	Scientific Name	Total no. of flights	No. of birds per flight	Total no. of individuals recorded
Hen harrier	<i>Circus cyaneus</i>	9	1	9
Red kite	<i>Milvus milvus</i>	1	1	1
Oystercatcher	<i>Haematopus ostralegus</i>	2	1-2	3
Lapwing	<i>Vanellus vanellus</i>	10	1-60	188
Golden plover	<i>Pluvialis apricaria</i>	21	1-130	581
Curlew	<i>Numenius arquata</i>	40	1-7	51
Woodcock	<i>Scolopax rusticola</i>	8	1-2	10
Snipe	<i>Gallinago gallinago</i>	26	1-4	41
Merlin	<i>Falco columbarius</i>	4	1	4
Peregrine	<i>Falco peregrinus</i>	6	1	6
Total no. of flights		356		8,568
*Species names and order in which they are listed follow the British List maintained by the BOU ¹				
** Considered by the surveyor to be greylag and/or pink-footed goose				

9.4.2.2 Foraging Goose Surveys

90. During the Foraging Goose Surveys, no geese were recorded foraging within the Survey Area. One flock of foraging pink-footed geese was recorded in the wider area, to the south of the Survey Area, with at least 82 individuals present approximately 2 km from the Site on 10/04/2019.

9.4.2.3 Goose Roost Surveys

91. Pink-footed geese were regularly recorded roosting on Cobbinshaw Reservoir between December and February, with a peak count of 1,200 birds. Records of roosting pink-footed geese are summarised below:

- 23/12/2019 – c.200 individuals;
- 07/01/2019 – Several flocks, totalling c.1,000 individuals, arrived after sunset;
- 08/01/2019 – A flock of at least c.450 individuals;
- 24/01/2019 – Four flocks totalling 1,150 individuals;
- 25/01/2019 – c.1,200 individuals;
- 12/02/2019 – A minimum of 60 individuals;
- 15/02/2019 – A minimum of 212 individuals;
- 25/02/2019 – A minimum of 71 individuals;
- 11/04/2019 – One roosting bird;
- 06/05/2019 – Three roosting birds; and
- 07/05/2019 – One roosting bird.

92. In addition, small numbers of feral greylag geese were frequently observed roosting, and counts of up to two taiga bean geese were also recorded infrequently.

9.4.2.4 Black Grouse Surveys

93. There were no records of black grouse during targeted Black Grouse Surveys (and the species was not recorded during any of the other 2018-19 Baseline Ornithology Surveys). As noted in Section 9.3.3, this species was scoped out of the assessment and is not discussed further within this Chapter.

9.4.25 Breeding Raptor Surveys

Target Species

94. Goshawk was the only target raptor species recorded during the Breeding Raptor Surveys, with a displaying pair recorded in May 2019, and two probable territories identified within the Site. However, it is believed that breeding was either abandoned or failed early in the season. Further details are provided in Confidential Appendix A9.2.
95. There was one incidental record of an immature peregrine hunting to the east of the Site Boundary, in the Woolfords area, while anecdotal evidence of a wintering hen harrier during 2018-19 and a merlin pair present in the wider area during April and May 2019 was provided anecdotally by two surveyors encountered on Site.

Secondary Species

96. Sparrowhawk, buzzard and kestrel were all confirmed or highly probable breeders within the Survey Area.

9.4.26 Long-Eared Owl Surveys

97. During targeted surveys, one male long-eared owl was recorded singing in May 2019, while potential wing-clapping was recorded during a survey in April, both to the south-west of the Site, however no confirmed territories were recorded. As long-eared owl is a highly cryptic species, it is possible that a small number of pairs were breeding on the Site.
98. There was one incidental record of long-eared owl during ecological walkover surveys in July 2019, with an adult bird flushed from scrub to the north-east of the Site. All records of long-eared owl are shown in Figure 9.1.8 at Appendix 1 of Appendix A9.1.

9.4.27 Moorland Breeding Bird Surveys

99. Of the total 67 species recorded during the MBBS, three species of breeding wader were recorded within 500 m of the Site: lapwing, curlew and snipe. Numbers of territories of each of these species are provided in Table 9.6. In addition, oystercatcher, golden plover and common sandpiper (*Actitis hypoleucos*) were recorded during the MBBS. Although no evidence of breeding by any of these species was observed within 500 m of the Site, there is suitable breeding habitat present for these species within the MBBS Area, particularly to the east of the Site Boundary.
100. The other species recorded during the MBBS included wildfowl, gamebird, raptor, gull, pigeon/dove, corvid (crow) and passerine (perching/songbird) species, many of which were recorded breeding within the Site. However, no breeding Schedule 1 birds or other notable breeding species were recorded.

Table 9.6 Summary of Wader Species of Conservation Concern Assessed as Breeding During the 2019 MBBS

Species*	Number of territories in MBBS Area			Conservation listings**
	Within Site Boundary	Within Buffer Area	Total	
Lapwing	0	1	1	Red; SBL
Curlew	0	2	2	Red; SBL
Snipe	0	1	1	Amber

Species*	Number of territories in MBBS Area			Conservation listings**
	Within Site Boundary	Within Buffer Area	Total	
<p>*Species names and order follow the British List maintained by the BOU¹</p> <p>**Red = UK Red-listed BoCC¹⁸; Amber = UK Amber-listed BoCC¹⁸; SBL = listed on the Scottish Biodiversity List²⁴.</p>				

9.4.3 Collision Risk Modelling Results

101. For each species for which CRM was completed, the annual risk of collision and number of years per collision, using species-specific avoidance rates recommended by NS⁵⁰, are presented in Table 9.7. Full results of the CRM are provided in Appendix A9.3.

Table 9.7 Estimated Seasonal Collision Risk and Number of Years Per Collision for Species for Which CRM Was Completed

Species	Period	Annual collision risk (no. of birds killed) using species-specific avoidance rates ⁵⁰	No. of years per collision using species-specific avoidance rates ⁵⁰
Greylag goose	2018/19 whole year	<0.01	223.74
Pink-footed goose	2018/19 whole year	0.56	1.80
Goshawk	2018/19 whole year	0.07	15.30
Golden plover	2018/19 whole year	0.01	68.87
Peregrine	2018/19 whole year	<0.01	610.32

9.5 ASSESSMENT OF POTENTIAL EFFECTS

9.5.1 Potential Effects on Birds

102. The main ways in which a wind farm may affect IOFs are via:

- Habitat loss due to land-take;
- Habitat modification;
- Disturbance/displacement; and
- Collision with turbines.

103. Each of these potential effects, during each phase of the Development life cycle (construction, operation and decommissioning) in which the effect could occur, is discussed in turn below.

104. In addition, as noted previously, cumulative effects may arise as a result of the combined effects of multiple developments affecting the same bird population. Cumulative effects are considered in Section 9.6.

⁵⁰ NS (2018) Avoidance Rates for the onshore NS Wind Farm Collision Risk Model

9.5.1.1 Effects during Construction

Habitat Loss

105. Construction of turbine bases, associated infrastructure and keyholing will lead to direct habitat loss. The severity of potential effects is dependent on the extent of land-take, the type of habitat affected and the species using the Site and surrounding area. In this case, the extent of habitat loss will be relatively small (8.94% of the Site). Keyholing will be used for clearance of woodland for turbines and associated infrastructure rather than clearfelling of the entire Site, which will minimise the impact of habitat loss on woodland species including goshawk and crossbill. No species associated with nearby statutory sites (identified in Section 9.3.5.1) will be impacted by habitat loss, and goshawk was the only species identified in NS guidance³¹ as a priority for assessment that made regular use of the Site for breeding, roosting or foraging. Other target raptors (hen harrier, merlin and peregrine) and waders (lapwing, curlew and golden plover) were only occasionally recorded within/flying over the plantation. Crossbill is likely to be breeding within suitable habitat across the Site (coniferous plantation).
106. Habitat loss is relatively small and largely comprises coniferous plantation (and tall ruderals). As most of the Site and the surrounding area is comprised of coniferous forestry, it is likely that the impacts of habitat loss will be minimal.

Habitat Modification

107. Habitat modification due to felling of the plantation will likely result in minor changes in Site use by certain IOFs. For example, it is anticipated that species such as merlin and hen harrier could forage over the Site more frequently as more open habitat becomes available. As keyholing will be used (rather than clearfelling the Site) there will only be a minor increase in the extent of open habitats created (~6.16%).

Disturbance and Displacement

108. During the construction phase of the Development, there will be increased levels of activity by Site personnel, vehicles and machinery, resulting in increased levels of noise and visual disturbance. This could lead to displacement or disruption of breeding, foraging and/or roosting birds if works are undertaken during the breeding season in proximity to nesting birds. The severity of potential effects depends on the following:
- The timing of works, with potential effects likely to be greatest during the breeding season;
 - The magnitude of the disturbance (e.g. a vehicle driving slowly along the access track without stopping is likely to result in a relatively low or even negligible magnitude of disturbance, whereas a period of prolonged and noisy machinery operation involving numerous Site personnel is likely to be of high magnitude);
 - The extent of displacement (both spatially and temporally);
 - The availability of suitable habitats in the surrounding area for displaced birds to occupy; and
 - The behavioural sensitivity of birds using the Site (which is likely to vary between species).

9.5.1.2 Effects during Operation

Disturbance and Displacement

109. The operation of turbines and increased human activity associated with maintenance of the Development has the potential to cause disturbance and displace birds from the Site. However, disturbance effects during the operational phase are likely to be of a lower magnitude than during construction, as some species may become habituated to turbines, and the level of human activity and associated disturbance on Site will be considerably reduced compared to the construction phase.

110. Individual turbines, or a wind farm as a whole, may present a barrier to the movement of birds, restricting or displacing birds from much larger areas. Based on the location and size of the Development, presence of other wind farms in the wider area, habitats within the Site and wider area, and target species flight activity, it is considered highly unlikely that there will be any barrier effects on any target species. Potential barrier effects have therefore been scoped out of the assessment.

Collision with Turbines

111. The frequency and likelihood of a collision occurring depends on a number of factors. These include aspects of the size and behaviour of the bird (including their use of a site), the nature of the surrounding environment and the structure and layout of the turbines. Clearly, birds that tend to fly above or below RSH are likely to collide less frequently than species that regularly fly at RSH. Collision risk is also likely to be higher for birds that spend much of the time in the air, such as foraging raptors and species that regularly commute between feeding and breeding or roosting grounds (e.g. geese and whooper swans), where this involves frequent flights over a site. The risk of bird collisions at wind farms is also higher in areas where large concentrations of birds are present (e.g. on major migration routes or close to roost sites used by large numbers of birds).
112. It should be noted that operational disturbance and collision risk effects are mutually exclusive in a spatial sense, i.e. a bird that avoids a wind farm due to disturbance cannot be at risk of collision with the turbine rotors at the same time⁵¹. However, they are not mutually exclusive in a temporal sense; a bird may initially avoid a wind farm but habituate to it, and could then be at risk of collision¹⁵.

9.5.1.3 Effects during Decommissioning

113. Turbine removal may cause disturbance to birds breeding, foraging or roosting on Site. The level of impact will depend on the bird species present at the time of decommissioning and cannot be reliably predicted at this stage. However, as decommissioning activities are generally of a similar type and intensity as construction activities, the assessment considers that the potential effects of decommissioning will be similar in nature to the potential effects of construction, with the exception that habitat is likely to be restored and any displaced birds will be able to return to abandoned territories.

9.5.2 Evaluation of Ornithological Features

114. An evaluation of the importance of each ornithological feature identified during the Desk Study or recorded during the Baseline Ornithology Surveys is provided in Table 9.8. As noted in Section 9.3.3, all statutory sites identified during the Desk Study have been scoped out of the assessment. Species evaluated as being of Regional or higher importance are considered to be IOFs, while those of Local or lesser importance are not considered to be IOFs and have been scoped out of the assessment in the following sections.

⁵¹ Madders, M. & Whitfield, D.P. (2006). Upland raptors and the assessment of wind farm impacts. *Ibis* 148, 43-56

Table 9.8 Evaluation of Importance of Ornithological Features

Importance level	Ornithological feature	Justification
International	No species using the Site and/or surrounding area were evaluated as being of international importance.	
National	No species using the Site and/or surrounding area were evaluated as being of national importance.	
Regional	Pink-footed goose	<p>Although wintering birds are a cited interest of the Westwater SPA, there is not considered to be any connectivity with this SPA (see Section 9.3.3), which NS agreed with (see Section 9.3.1). Pink-footed goose is also BoCC Amber-listed, and identified in NS guidance³¹ as a priority species for assessment. Flocks of up to 1,000 birds were frequently recorded during FAS, which is equal to 6.25% of the estimated peak abundance for NHZ 17³⁴(16,237 individuals). The species also regularly roosted at Cobbinshaw Reservoir, where the peak count was 1,200 individuals.</p> <p>Within NHZ 17, the wintering population of pink-footed goose is relatively stable throughout the winter, in contrast to other areas of Scotland where there is an autumn peak, with birds stopping off on their southward migration to England³⁴.</p> <p>Use of the Site and surrounding area is unlikely to increase following construction. However, due to the high numbers of birds recorded there is the potential for a discernible collision risk to this species at the NHZ scale; therefore, the population using the Site and surrounding area has been evaluated as being of regional importance.</p>
	Goshawk	<p>A Schedule 1 species identified in NS guidance³¹ as a priority for assessment. The species was recorded frequently during surveys, with two probable territories present (no confirmed breeding), and a historical nest (which may be part of one of the probable territories recorded in 2019), within the Site. Based on the extent of suitable breeding habitat present and high levels of disturbance associated with forestry operations, it is considered unlikely that use of the Site will increase following construction.</p> <p>A population of two pairs nesting within the Site would equate to ~40% of the NHZ population (<5 pairs as a minimum estimate), however it is noted that the population of goshawk is likely to be an underestimate and highly conservative, and there is little data on goshawk populations within the NHZ³⁴ as goshawk is a discreet and under-recorded species.</p> <p>More recent information from the Scottish Raptor Monitoring Scheme¹⁶ suggests that the population of Scottish goshawk is slowly expanding from two clusters within Southern Scotland and northeast Scotland³⁴, with an increasing population in South Strathclyde. A national population estimate of 174 pairs is given, and with extensive suitable habitat present within Scotland, it is likely that the national population will increase in the future.</p> <p>Using a conservative estimate of two breeding territories present on Site, this would equate to ~1.15% of the national population, which is likely to be an overestimate.</p>

Importance level	Ornithological feature	Justification
	Crossbill	<p>As the Site is outside the known breeding distribution of Scottish crossbill (<i>Loxia scotica</i>)⁵², it is considered that crossbill species breeding on Site are 'common' crossbill (<i>L. curvirostra</i>). Crossbill is included on Schedule 1. Small numbers were recorded incidentally (no breeding was identified; however, crossbill was not a target species) during the MBBS, and based on the habitats present (as well as fact that the species was recorded during the 2013 MBBS), crossbill is likely to be breeding on Site.</p> <p>Crossbill is widespread in Scotland within coniferous forestry, and the national breeding population is very variable, between 5,000-50,000 pairs each year²⁰. As crossbill is not a priority species for assessment no targeted surveys were completed. Previous surveys carried out in 2013³⁹ recorded a peak of 23 individuals in March. No estimate of the number of breeding territories was provided.</p> <p>The Scottish population of crossbill is so large that the population of breeding birds on Site is likely to represent a negligible proportion of the national population. Use of the Site and surrounding area is unlikely to increase following construction and the population using the Site has been evaluated as being of regional importance.</p>
Local	<ul style="list-style-type: none"> • Greylag goose 	<p>An Amber-listed BoCC identified in NS guidance³¹ as a priority species for assessment, which was infrequently recorded during the FAS, with a peak count of 30 birds. Although small numbers of greylag geese were frequently observed roosting at Cobbinshaw Reservoir, these were considered to be feral birds. Use of the Site and surrounding area is unlikely to increase following construction.</p>
	<ul style="list-style-type: none"> • Taiga bean goose 	<p>Although wintering birds are a cited interest of the Slamannan Plateau SPA, there is not considered to be any connectivity with this SPA (see Section 9.3.3), which NS agreed with (see Section 9.3.1). The species is also included on the UK BoCC Red list and the SBL. There was one registration of a single taiga bean goose during the FAS and occasional registrations of up to two birds on Cobbinshaw Reservoir. However, there was no evidence of regular flight activity over the Site or any foraging activity in the surrounding area.</p>
	<ul style="list-style-type: none"> • Golden eagle 	<p>Listed on Annex I, Schedule 1/1A/A1 and the SBL. However, there was only a single registration of one bird and no records of nesting within 2 km of the Site. Use of the Site is highly unlikely to increase post-construction, and there is no suitable habitat for breeding.</p>
	<ul style="list-style-type: none"> • Marsh harrier 	<p>Listed on Annex I, Schedule 1, the SBL and BoCC Amber list. However, there were only five registrations of one bird on one visit, with no evidence of breeding or roosting, and this species is rare in the NHZ. There is no suitable nesting habitat within 2 km of the Site, and use of the Site is highly unlikely to increase post-construction.</p>
	<ul style="list-style-type: none"> • Hen harrier 	<p>Listed on Annex I, Schedule 1/1A, the SBL and the BoCC Red list. However, there were only nine registrations of single birds, with the majority outwith the Site, and no records of nesting within 2 km of the Site. As there are high</p>

⁵² Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. and Fuller, R.J., (2013) *Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland*. Thetford: BTO.

Importance level	Ornithological feature	Justification
		levels of disturbance on Site due to forestry operations, and habitat present within and adjacent to the Site is sub-optimal for breeding, use of the Site is unlikely to increase post-construction.
	<ul style="list-style-type: none"> • Red kite 	Listed on Annex I, Schedule 1.1/1A, the SBL and the BoCC Red list. However, there was only a single registration of one bird, and no records of nesting within 2 km of the Site. Use of the Site is highly unlikely to increase post-construction; although there is suitable breeding habitat, the Site is not within the current core breeding range ^{16,52} for red kite and high levels of disturbance associated with forestry operations are likely to deter birds from nesting.
	<ul style="list-style-type: none"> • Short-eared owl 	Listed on Annex I, the SBL and the BoCC Amber list. There was a single incidental record of one foraging bird during the Goose Surveys, but no records of nesting or roosting within 2 km of the Site. Use of the Site by breeding birds is unlikely to increase post-construction due to habitats present and existing disturbance levels associated with forestry operations. However, there is the potential for keyholed areas to be used occasionally by foraging birds present in the wider area.
	<ul style="list-style-type: none"> • Merlin 	Listed on Schedule 1, the SBL and the BoCC Red list. Individual birds were infrequently recorded during the FAS, largely outwith the Site, and no evidence of breeding or roosting within 2 km of the Site during surveys. Anecdotal information suggests that merlin bred in the wider area. There is the potential for merlin to breed on Site in future in low numbers, as suitable nesting habitat is present (e.g. disused corvid nests) and foraging activity could also increase within key-holed areas post-construction. However, the habitats on Site are likely to be sub-optimal for hunting and nesting birds, and are likely to remain so following construction.
	<ul style="list-style-type: none"> • Peregrine 	Listed on Annex I, Schedule 1 and the SBL. There were only seven registrations of single birds, with the majority of records outwith the Site, and no records of nesting within 2 km of the Site. Use of the Site is unlikely to increase post-construction. CRM was completed for this species as a precautionary measure; however, the predicted collision risk was negligible.
	<ul style="list-style-type: none"> • Lapwing 	Listed on the SBL and BoCC Red list, and identified in NS guidance ³¹ as a priority species for assessment. Lapwing was regularly recorded during both breeding and non-breeding season FAS and one breeding pair was recorded within 500 m of the Site. With an estimated breeding population of 71,500 – 105,600 pairs, lapwing is a common and widespread breeding bird in Scotland ²⁰ . However, recent data from annual national monitoring surveys of breeding birds organised by the British Trust for Ornithology (BTO) found significant declines in numbers of breeding lapwing in Scotland of 56% between 1995 and 2018 ⁵³ . One breeding pair of lapwing on Site equates to <0.01% of the Scottish breeding population. No NHZ population estimate is available for this species.

⁵³ Harris, S.J., Massimino, D., Balmer, D.E., Eaton, M.A., Noble, D.G., Pearce-Higgins, J.W., Woodcock, P. & Gillings, S. 2020. *The Breeding Bird Survey 2019*. BTO Research Report 726. British Trust for Ornithology, Thetford.

Importance level	Ornithological feature	Justification
		<p>Scottish wintering populations are estimated at 65,000 – 69,000 lapwing²⁰; a peak count during FAS of 60 birds, is approximately 0.09% of the lowest estimate for the national non-breeding population. Due to the low numbers of birds on Site, which is unlikely to increase post-construction, lapwing is evaluated as being of local importance.</p>
	<ul style="list-style-type: none"> • Golden plover 	<p>Listed on Annex I and the SBL, and in NS guidance³¹ as a priority species for assessment. Golden plover was regularly recorded during non-breeding season FAS in small flocks (peak count of 130 individuals, mean count 30). Only one flight was recorded during the breeding season and there was no evidence of breeding within 500 m of the Site. Use of the Site is unlikely to increase significantly post-construction, as almost all activity was associated with open areas.</p> <p>The national population of golden plover is estimated at 37,480 breeding pairs, of which 508 pairs are present in NHZ 17³⁴. No estimation of the non-breeding population is given; however, it is likely to be greater than the breeding population, with migratory birds arriving in Scotland from Iceland, Greenland and Fennoscandia²⁰. For this reason, golden plover is evaluated as being of local importance.</p> <p>CRM was completed for this species as a precautionary measure; however, the predicted collision risk was negligible.</p>
	<ul style="list-style-type: none"> • Curlew 	<p>Listed on the SBL and BoCC Red list, and identified in NS guidance³¹ as a priority species for assessment. Curlew was regularly recorded during breeding season FAS (largely single birds) and two territories were recorded within 500 m of the Site. There are an estimated 30,194 breeding pairs of curlew in Scotland, with an estimated 2,303 pairs within NHZ 17³⁴</p> <p>Two breeding pairs of curlew equates to ~0.09% of the NHZ 17 breeding population, and use of the Site by this species is unlikely to increase post-construction, as almost all activity was associated within open areas. For these reasons, curlew is evaluated as being of local importance.</p>
	<ul style="list-style-type: none"> • Herring gull 	<p>Listed on the SBL and BoCC Red list, and identified in NS guidance³¹ as a priority species for assessment. Herring gull was frequently recorded during FAS as a secondary species. Flocks of herring gull were regularly recorded during breeding season FAS, with a maximum five-minute count of 266 individuals, although flocks were usually smaller than this. There was a regular flight N-S flight path across the western end of the Site, with birds attracted to Levenseat landfill to the NW of the Site. Herring gull is not a designated feature of any statutory site with connectivity to the Site.</p> <p>The NHZ 17 population of herring gull is estimated at 2,928 breeding pairs, which is thought to be an underestimate as urban colonies are poorly recorded³⁴. The peak FAS count of 266 birds is equal to ~9% of the NHZ 17 population (), although this is likely to be an overestimate as there was poor coverage of inland breeding colonies. As such, there are unlikely to be any effects at the population level, and CRM has not been conducted for this species.</p> <p>Use of the Site is unlikely to increase post-construction, and herring gull is evaluated as being of local importance.</p>
<ul style="list-style-type: none"> • Long-eared owl 	<p>Recorded on Site and likely breeding in small numbers, but not identified in NS guidance as a priority for assessment³¹. Not listed on Annex I, Schedule 1, or the SBL and included on the BoCC Green list of species of lowest conservation concern.</p>	

Importance level	Ornithological feature	Justification
	<ul style="list-style-type: none"> Other wildfowl, raptor, wader, gull, near-passerine and passerine species of conservation concern 	<p>Species of conservation concern that are generally considered as being at low risk from wind farm developments. It is considered unlikely that the Development would have a significant impact on local populations.</p>
Less than Local	<ul style="list-style-type: none"> All species not covered above (e.g. Green-listed species of low conservation concern) 	<p>Species that are generally common and widespread, of low conservation concern and which are considered as being at low risk from wind farm developments.</p>
<p>*Note that good practice will be implemented during construction to protect all nesting birds (see Section 9.3.10), including species scoped out of the assessment.</p>		

115.

9.5.3 Assessment of IOFs

116. Potential effects of the Development on each IOF are assessed below, with IOFs considered in BOU taxonomic order¹.
117. The assessment considers the significance of potential impacts following implementation of the embedded mitigation proposed in Section 9.3.10.

9.5.3.1 Species of Regional Importance

Pink-footed Goose

118. **Potential Construction Effects:** This species was largely recorded during FAS during the non-breeding season, with no foraging or roosting birds recorded within 500 m of the Site. Therefore, birds will not be affected by habitat loss or modification, and are not considered to be at risk of disturbance during construction.
119. **No significant effects** in terms of the EIA Regulations are predicted for pink-footed goose during construction.
120. **Potential Operational Effects:** As no foraging or roosting birds were recorded within 500 m of the Site, there will be no significant effects on pink-footed goose due to disturbance during operation. Pink-footed goose was regularly recorded during non-breeding season FAS; therefore CRM has been undertaken for this species. Based on the 2018-19 data, CRM predicted an annual collision risk of 0.56 pink-footed geese per year, or a collision every 1.80 years. A total annual collision risk of 0.56 birds would represent <0.01% of the NHZ population (16,237 individuals)³⁴, or 14 birds over the lifetime of the wind farm.
121. As such, potential operational phase effects on the NHZ pink-footed goose population are assessed as being of **negligible** magnitude and **not significant** in terms of the EIA Regulations.
122. **Potential decommissioning effects:** these are likely to be of the same nature as construction effects. Therefore, **no significant effects** during decommissioning are predicted for pink-footed goose, in terms of the EIA Regulations.

Goshawk

123. **Potential Construction Effects:** Although there was no confirmed breeding during baseline surveys, it was considered probable that two territories were present (which may have failed early in the season), and the species is known to have nested within the Site historically. It is therefore considered likely that goshawk will nest on Site post-construction, and during construction, and there is the potential for breeding birds to be affected by both habitat loss and disturbance. Further details of activity, probable territory locations and historic nest locations are provided in Confidential Appendix A9.2.
124. There is the potential for historic nests to be lost if they are located in areas of coniferous plantation or broadleaved woodland which are felled during construction (outwith the goshawk breeding season). Keyholing (and future forestry operations) will also result in loss of suitable breeding habitat. A total of 49.90 ha of woodland (6% of woodland within the Site) will be lost due to works, which could limit the number of breeding goshawk in future. New nesting habitat will likely become available as areas of young plantation mature, which will mitigate some loss of nesting habitat.
125. Additionally, suitable alternative nesting habitat is present within the Site to accommodate goshawk. Birds can have up to four different nesting areas within their range and may move up to 2.5 km to another nest site²². On Site, a historic nest was lost in 2013 due to felling, which resulted in a new nest being established in 2014 ~85 m from the previous nest. This illustrates that goshawk on Site can establish new nest

locations in response to disturbance/habitat loss. The impact of habitat loss is therefore likely to be low magnitude.

126. In addition, the construction of the proposed wind farm will result in the loss of certain habitats which are expected to be part of the resident goshawks' traditional foraging grounds, including intact broadleaved plantation woodland, coniferous plantation woodland and open areas of clearfell. Goshawk have a core range of 3 km, with a maximum range of 10 km, giving a core foraging range of 2,827 ha and a maximum foraging range of 31,415 ha **Error! Bookmark not defined.** The majority of the Site contains suitable habitat for foraging goshawk, with 736 ha of woodland and 95 ha of clearfell⁵⁴.
127. Loss of foraging habitat within the Site amounts to 54.18 ha: 6.51% of suitable foraging habitats present within the Site. This is only 1.92% of the core foraging range for goshawk; therefore, loss of foraging habitat is considered to be negligible.
128. Disturbance during construction works could deter goshawk from nesting within areas of the Site, which will be temporary, reversible, and of short-term duration, most likely only deterring breeding attempts for a single breeding season within the disturbance distance for nesting goshawk **Error! Bookmark not defined.** (300 m -500 m)²³. As the Site is an actively managed commercial plantation, it is likely that birds may be habituated to existing levels of disturbance associated with forestry operations²³. Furthermore, although any works within 300-500 m of nesting goshawk have the potential to disturb the nest, which is an offence and could impact on nesting success, this risk will be avoided through a specific Goshawk Mitigation Plan, which is outlined in Confidential Appendix A9.2 and would include pre-construction surveys, implementation of an exclusion buffer around any active nests within which no works are permitted and monitoring of any active nests.
129. There is also the potential for disturbance to foraging goshawk, which could impact on their ability to hunt, thus impacting on their survival, or ability to provision young during nesting. As noted above, there is abundant foraging habitat present on Site, with construction only undertaken within small areas of the Site at any one time. Additionally, goshawk are likely to be less susceptible to disturbance during foraging compared to at the nest.
130. The effects of construction of the Development on the NHZ 17 goshawk population are predicted to be of **low** magnitude and therefore considered to be **not significant** in terms of the EIA Regulations.
131. **Potential Operational Effects:** There is the potential for turbines to deter goshawk from nesting nearby, which could limit potential expansion of goshawk within the Site. However, as discussed above in relation to construction, it is anticipated that resident goshawks will be able to establish nest sites in alternative areas of suitable habitat within the Site. Relatively high levels of disturbance due to harvesting operations are regularly experienced by goshawks breeding within commercial coniferous plantations, with goshawks generally continuing to nest on active sites. This was the case at Heathland, where the 2013 nest was felled and an alternative nest established in 2014 ~85 m away. The 2014 historic nest is located ~181 m from the nearest felling buffer, ~185 m from infrastructure and ~365 m from the nearest turbine.

There is also the potential for displacement from foraging habitat during operation. Despite keyholing, which will minimise the loss of suitable foraging habitat in comparison to clearfelling the Site, it is likely that goshawk will avoid foraging habitat in close proximity to turbines. Habitat within which goshawk could be deterred from foraging would encompass a small proportion of the species core range of 3 km. Additionally,

⁵⁴ Goshawk foraging habitat includes all broadleaved woodland, coniferous woodland and clearfell.

there is further suitable foraging habitat outwith the Site, with adjacent coniferous plantation to the west and northeast of the Site which could be used by foraging goshawk. Consequently, the effect of operational displacement on foraging goshawk is anticipated to be negligible.

132. Due to the high level of goshawk flight activity associated with the Site (5,481 seconds observed at RSH during the FAS), the annual predicted collision risk is 0.07, or one bird every 15.30 years, which equates to a predicted maximum of two collisions over the expected 30-year lifespan of the Development. However, while the effect of collision on the local (on-Site) goshawk population would be of relatively high magnitude, the predicted risk is likely to be an overestimate, because all flights recorded within height bands 1-3 in the CRZ were used in the CRM, whereas some flights were likely to be below or above the RSH of one or both candidate turbine models. Collision rates are also based on activity within the Site pre-construction, following construction keyholing will remove suitable nesting habitat in proximity to turbines, and flight activity may be reduced around turbines. In addition, collision risk at the NHZ level is of much lower magnitude.
133. Although the population within NHZ 17 is small, goshawk is likely to be under-recorded, and there is abundant suitable habitat within the NHZ which is likely to be gradually colonised by the expanding population in the future. As such, collision risk to the NHZ 17 population from the Development is expected to decrease in magnitude as the population expands. Furthermore, there are no publicly available reports of goshawk collisions with turbines in the UK, and data collected from other European onshore wind farms⁵⁵ suggest that this species is not notably vulnerable to collision (although it is acknowledged that this data has limitations because the locations of monitored wind farms and extent of monitoring is not known).
134. The effects of the operational phase of the Development on the NHZ 17 goshawk population are predicted to be of **low** magnitude and therefore **not significant** in terms of the EIA Regulations.
135. **Potential decommissioning effects:** these are likely to be of the same nature as construction effects. Therefore, **no significant effects** during decommissioning are predicted for goshawk, in terms of the EIA Regulations.

Crossbill

136. **Potential Construction Effects:** This species was recorded incidentally during MBBS, was recorded as a breeding species during historical surveys, and therefore is likely to be breeding in areas of suitable habitat onsite. Birds will lose nesting, roosting and foraging habitat during felling. It is considered likely that displaced birds will be accommodated within existing plantation woodland within the Site or wider area. The majority of the Site contains suitable habitat for crossbill, with 608.28 ha of coniferous plantation, therefore the impact of loss of suitable habitat (8% of suitable habitat⁵⁶ within the Site) is likely to be negligible. Furthermore, the number of birds affected is likely to represent only a very small proportion of the regional population of breeding crossbills.
137. The embedded mitigation described in Section 9.3.10 includes measures to avoid disturbance to breeding birds. By following these, the risk of disturbance to breeding birds will be minimised.

⁵⁵ Dürr, T. (2019). *Vogelverluste an Windenergieanlagen / Bird fatalities at wind turbines in Europe*; Daten aus der zentralen Fundkartei der Staatlichen Vogelschutzwarte im Landesamt für Umwelt Brandenburg zusammengestellt: Tobias Dürr; Stand vom: 07 January 2020 [Online] Available at: <http://www.lfu.brandenburg.de/cms/detail.php/bb1.c.312579.de> (Accessed 26/08/20).

⁵⁶ Suitable habitat is considered to be any coniferous plantation woodland.

138. As such, potential construction phase effects on the regional crossbill species population are assessed as being of **low** magnitude and considered to be **not significant** in terms of the EIA Regulations.
139. **Potential Operational Effects:** It is unlikely that any breeding birds will be disturbed during operation, with implementation of mitigation measures listed in Section 9.3.10 for any significant operational works. Furthermore, it is generally considered that passerine species are not significantly impacted by wind farms²⁷, and collision risk is thought to be negligible. As such, potential operation phase effects on the regional crossbill species are assessed as being of **negligible** magnitude and considered to be **not significant** in terms of the EIA Regulations.
140. **Potential decommissioning effects:** these are likely to be of the same nature as construction effects. Therefore, **no significant effects** during decommissioning are predicted for crossbill, in terms of the EIA Regulations.

9.6 CUMULATIVE EFFECT ASSESSMENT

141. Potential cumulative effects can include direct habitat loss, disturbance and collision risk. The potential for each of these potential effects is considered in turn below.

9.6.1 Cumulative Habitat Loss

142. The total habitat loss will be 74.38 ha, largely coniferous woodland (67%) and recently felled coniferous woodland (14%) which is considered to be so minimal in relation to the overall extent of these habitats that it is unlikely that there will be any potential for cumulative effects on IOFs (goshawk and crossbill) due to direct habitat loss. The remaining 19 % would include small amounts of broadleaved woodland, marshy grassland and scattered scrub.

9.6.2 Cumulative Disturbance

143. Disturbance effects are predicted to be of low to negligible magnitude for IOFs at risk of disturbance (goshawk and crossbill). It is likely that most displaced birds will breed in the wider area, and some displaced birds will potentially return to breed on or around a development site post-construction, particularly at those sites where there is abundant suitable habitat. These birds would therefore only be temporarily lost from the breeding population. Furthermore, as developments are at different phases of their life-cycle and most displacement is likely to occur during the construction phase, the numbers of birds displaced annually will be relatively small. It is considered that any disturbance during the construction, operational or decommissioning phases of the Development will be so minimal that there is no potential for significant cumulative disturbance impacts on IOFs.

9.6.3 Cumulative Collision Risk

144. Predicted collision risk (<0.01% of the NHZ 17 population annually) to pink-footed goose is considered to be too low to result in any significant cumulative effects, with pink-footed goose avoidance rates extremely high, and NS agreed that there is no connectivity with SPA populations (Section 9.3.1).
145. One goshawk collision every 15.30 years is considered too low to result in any significant effects. A search for any relevant reports from wind farm applications within 10 km of the Site was conducted to assess the cumulative collision risk to goshawk. While every effort was made to source relevant information, in many cases data could not be obtained. The following applications within 10 km were searched for any information regarding goshawk, as outlined in Table 9.9:

Table 9.9 Summary of Information to Inform Goshawk Cumulative Collision Risk

Development Name	Status	Notes
Hill Rig Wind Farm	Application Refused	No goshawk recorded during ornithology surveys
Benhar Wind Farm	Application Refused	No goshawk recorded during ornithology surveys
West Benhar Wind Farm	Consented	A single goshawk flight was recorded, with no evidence of breeding. No CRM was conducted for goshawk.
Harburnhead Wind Farm	Operational	One potential goshawk prey item was recorded, however there were no confirmed records of goshawk during ornithology surveys
Muirhall Wind Farm	Operational	No information could be found.
Muirhall Extension and Muirhall South Wind Farm	Operational	One goshawk was recorded during FAS surveys at collision height and there is a known goshawk nest nearby. Collision risk was stated to be "very low", however no specific estimated collision rates could be found. No significant effects on goshawk were predicted.
Pearie Law Wind Farm	Operational	No goshawk was recorded during surveys.
Longhill Burn Wind Farm	Consented	Adjacent to Heathland, eight goshawk flights were recorded at PCH, with an estimated 0.75 collisions per year. This was thought to be an overestimate, with one flight recorded lasting 21 minutes, which resulted in high predicted collisions. There was no confirmed goshawk breeding recorded, although a potential historic goshawk nest was found.
Camilty Wind Farm	Operational	A collision estimate of one bird every three years (0.30 individuals per year) was predicted. This was predicted to have a slight adverse effect on the regional population and was not significant.
Black Law Wind Farm Extension (Phase 1)	Operational	No significant effect predicted.
Black Law Wind Farm Extension (Phase 2)	Operational	A nest was recorded 1.7 km from the Site, however goshawk was not recorded during VP surveys, therefore no significant effects were predicted.
Tormywheel Wind Farm	Operational	No information could be found.
Pates Hill Wind Farm	Operational	No information could be found.
Fauch Hill Wind Farm	Unknown	No information could be found.
Black Law Wind Farm	Operational	No information could be found.

146. Table 9.9 shows that goshawk has been recorded at a number of nearby developments, with low levels of goshawk activity observed at the majority of sites within 10 km (where information could be sourced). Greater activity and risk of collision was noted at Camilty Wind Farm and Longhill Burn Windfarm, although the high predicted collision risk at

Longhill Burn Wind Farm was thought to be an overestimate, with one extremely long flight recorded at PCH.

147. Longhill Burn Wind Farm was consented in April 2020 and predicted no significant cumulative effects on the goshawk population (this considered collisions at Camilty Wind Farm). Cumulative collision risk at Longhill Burn Wind Farm and Camilty Wind Farm is equal to one goshawk collision every 0.95 years (with species-specific avoidance). With the additional cumulative collision risk for Heathland Wind Farm (Section 9.4.3), this amounts to one goshawk collision every 0.89 years. This is considered to be a relatively minor increase in cumulative collisions.
148. The goshawk population is known to be an underestimate in NHZ 17, and is likely to increase in future. An additional maximum of two goshawk collisions during the lifespan of Heathland Wind Farm is considered unlikely to significantly increase the cumulative collision risk previously predicted at the adjacent Longhill Burn Wind Farm, where no significant effects were predicted. It is therefore considered that cumulative collision effects are likely to be of low magnitude and **no significant effects** are predicted in terms of the EIA Regulations.

9.7 MITIGATION, MONITORING AND RESIDUAL EFFECTS

9.7.1 Mitigation

149. Embedded mitigation is described in Section 9.3.10. Mitigation relating to breeding goshawk is outlined in a specific Goshawk Mitigation Plan in Confidential Appendix A9.2. No requirements for further mitigation were identified.

9.7.2 Monitoring

150. It is proposed that ornithological monitoring should take place post-construction, in line with NS guidance⁵⁷ as outlined below:
- Year-round collision monitoring: carcass searches, carcass persistence trials and observer efficiency trials should be completed at least once per month throughout the year, to determine whether actual bird collisions are in line with predicted values. Carcasses of all species found on Site should be recorded;
 - Goshawk nest monitoring a minimum of four survey visits between March and August to identify any breeding goshawk territories within 1 km of the Development, following the methods described in Hardey *et al.* (2013)²²; and
 - All monitoring data will be shared with the landowner.
151. In line with NS guidance⁵⁸, the above monitoring is proposed to take place annually during construction, and after the Development becomes operational, during years 1-3, 5, 10 and 15, with the requirement for further surveys to be determined based on previous survey results.

9.7.3 Residual Effects

152. Following implementation of the embedded mitigation measures described in Section 9.3.10, no significant effects on any IOFs during any phase of the Development life cycle are predicted.

9.8 SUMMARY OF EFFECTS

153. Table 9.10 provides a summary of the effects detailed within this chapter.

⁵⁷ NS (2009) *Monitoring the Impact of Onshore Wind Farms on Birds*. Guidance Note.

⁵⁸ NS (2009) *Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms*. Guidance Note. .

Table 9.10 Summary of Effects on IOFs

IOF*	Potential Effect	Significance of Effect**	Mitigation Proposed***	Residual Effect
Construction Phase				
Goshawk	Loss of nesting habitat	Not significant	N/A	Not significant
	Loss of foraging habitat	Not significant	N/A	Not significant
	Disturbance to nesting birds	Not significant	If breeding birds are present within 500 m of works, a Breeding Goshawk Mitigation Plan, detailing measures to protect breeding birds from disturbance, will be produced in consultation with NS	Not significant
	Disturbance to foraging birds	Not significant	N/A	Not significant
Crossbill	Disturbance to nesting birds	Not significant	N/A	Not significant
	Loss of nesting habitat	Not significant	N/A	Not significant
Operational Phase				
Pink-footed Goose	Collision risk	Not significant	N/A	Not significant
Goshawk	Disturbance to nesting birds	Not significant	N/A	Not significant
	Disturbance to foraging birds	Not significant	N/A	Not significant
	Collision risk	Not significant	N/A	Not significant
	Cumulative Collision risk	Not significant	N/A	Not significant
Crossbill	Disturbance to nesting birds	Not significant	N/A	Not significant
Decommissioning Phase				
Goshawk	Loss of nesting habitat	Not significant	N/A	Not significant
	Loss of foraging habitat	Not significant	N/A	Not significant
	Disturbance to nesting birds	Not significant	If breeding birds are present within 500 m of works, a Breeding Goshawk Mitigation Plan,	Not significant

IOF*	Potential Effect	Significance of Effect**	Mitigation Proposed***	Residual Effect
Construction Phase				
			detailing measures to protect breeding birds from disturbance, will be produced in consultation with NS	
	Disturbance to foraging birds	Not significant	N/A	Not significant
Crossbill	Disturbance to nesting birds	Not significant	N/A	Not significant
	Loss of nesting habitat	Not significant	N/A	Not significant
<p>*Species names and order in which they are listed follow the British List maintained by the BOU</p> <p>**The significance of effect assumes that the embedded mitigation described in in Section 9.3.10 is fully implemented</p> <p>***Where this is additional to the embedded mitigation described in Section 9.3.10; although no significant effects on goshawk are predicted, specific mitigation for this species (if breeding within 500 m of works) will be required to ensure compliance with legislation protecting breeding Schedule 1 species</p>				

9.9 STATEMENT OF SIGNIFICANCE

154. An assessment has been made of the potential for significant effects of the Development on IOFs. Embedded mitigation measures detailed in Section 9.3.10 and specific goshawk mitigation outlined in Confidential Appendix A9.2, will be implemented. Accounting for this, the magnitude of effects of the Development on IOFs both alone and in combination with other schemes are assessed as being of low to negligible magnitude, and thus non-significant in terms of the EIA Regulations.

9.10 GLOSSARY

155. The following terms are used within this Chapter to describe the Development and various associated study areas:

- **The Development:** the physical components of the proposed Heathland Wind Farm, i.e. the turbines and all associated infrastructure, including the access track;
- **The Site Boundary:** the red line or application boundary as shown in Figure 1.2;
- **The Site:** the area of land proposed to be developed, including all turbines and associated wind farm infrastructure;
- **Turbine Envelope:** the area within 500 m of the proposed turbine locations;
- **Vantage Point (VP) Viewshed:** the visible area within 2 km of a VP location, identified using GIS analysis;
- **Collision Risk Zone:** the area within which target species were considered to be at risk of collision for the purposes of Collision Risk Modelling (CRM; see Section 9.3.7). For species following direct (regular) flight paths (e.g. greylag goose, *Anser anser*) this was the area within the Turbine Envelope; for species following random (irregular) flight paths (e.g. goshawk, *Accipiter gentilis*) this was the visible area within the VP Viewsheds;
- **Survey Area:** the area surveyed during a particular Baseline Ornithology Survey, which in all cases comprised the land within the Site Boundary, and for some surveys, also included an appropriate Buffer Area around this. Survey Areas are shown in Figure 9.1.1, Appendix A9.1;
- **Buffer Area:** the component of a Survey Area around (but not within) the Site Boundary;
- **Rotor Swept Height (RSH):** the height of the airspace that would be swept by the candidate turbine rotors when operational. The Development will consist of two turbine models, three turbines with an RSH of 17 m-150 m, and eleven turbines with an RSH of 22 m -180 m; and
- **Potential Collision Height (PCH):** bird flight heights potentially within the RSH.