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Chapter 7.

Ornithology Assessment

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Glossary

Term	Definition
Environmental Impact Assessment	Environmental Impact Assessment (EIA) is a means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development.
Environmental Impact Assessment Regulations	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations)
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations
Proposed Development	The South Kyle II Wind Farm development
Proposed Development Area	The area within the “Site boundary” as illustrated on Figure 1.1, Volume 3a, which the Proposed Development will be located

List of Abbreviations

List and describe your abbreviations here.

Abbreviation	Description
AA	Appropriate Assessment
Applicant	Vattenfall Wind Power Ltd, the Applicant
BERP	Biodiversity Enhancement and Restoration Plan
BoCC	Birds of Conservation Concern
CEMP	Construction Environment Management Plan
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CRM	Collision Risk Modelling
CRZ	Collision Risk Zone
DGRSG	Dumfries and Galloway Raptor Study Group
EAC	East Ayrshire Council
EclA	Ecological Impact Assessment
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment

Abbreviation	Description
EIAR	Environmental Impact Assessment Report
EU	European Union
HMP	Habitat Management Plan
IBA	Important Bird Area
IOF	Important Ornithological Feature
LNCS	Local Nature Conservation Site
LNR	Local Nature Reserve
LPA	Local Planning Authority
LWS	Listed Wildlife Site
MAGIC	Multi-Agency Geographic Information for the Countryside
MBBS	Moorland Breeding Bird Survey
MBEC	Mackenzie Bradshaw Environmental Consulting
Natural Power	Natural Power Consultants Limited, the lead EIA Co- Ordinator
NHZ	Natural Heritage Zone
NNR	National Nature Reserve
NPF4	National Planning Policy Framework 4
OEMP	Operational Environment Management Plan
PAN	Planning Advice Note
PCH	Potential Collision Height
pWS	Provisional Wildlife Site
RSG	Raptor Study Group
RSPB	Royal Society for the Protection of Birds
SBL	Scottish Biodiversity List
SINC	Site of Importance for Nature Conservation
SNH	Scottish Natural Heritage (now NatureScot)
SPA	Special Protection Area
SPP	Species Protection Plan
SRMS	Scottish Raptor Monitoring Scheme
SSRSG	South Strathclyde Raptor Study Group
SSSI	Site of Special Scientific Interest
SWBSG	Scottish Windfarm Bird Steering Group
SWSEIC	South West Scotland Environmental Information Centre
SWT	Scottish Wildlife Trust
VP	Vantage Point
WCA	Wildlife and Countryside Act 1981 (as amended)
Zol	Zone of Influence

7.1. Statement of Competence

- 7.1.1. The author of this chapter has five years of experience in the environmental sector in ecology and conservation, with four of those years in environmental consultancy focused on onshore renewable energy developments including wind and solar. During this time, they have been involved with management of onshore wind development projects, production of Environmental Impact Assessment Report (EIAR) ornithology chapters, scoping reports, technical baseline reports, operational monitoring reports as well as client and consultee liaison. They are an experienced ornithologist, with seven years of experience in conducting various ecology and ornithology surveys, including breeding raptor and wader monitoring, seabird population monitoring and boat-based seabird surveys. The author was assisted by a Senior Environmental Consultant who has been working in renewable and non-renewable development sectors for 11 years, and an Associate Technical Director (Ecology) with over 17 years of experience in consultancy, EclA and EIAR compilation.

7.2. Introduction

Summary of Chapter

- 7.2.1. In order to inform the Environmental Impact Assessment (EIA), a desk study and baseline ornithology surveys were undertaken between April 2021 and February 2023. All surveys were undertaken following the most relevant industry guidelines and incorporated relevant scoping responses. The Proposed Development is not located within any statutory sites designated for ornithological interests.
- 7.2.2. An assessment has been made of the predicted significance of effects of the proposed South Kyle II Wind Farm (hereafter referred to as the Proposed Development) on ornithological interests. This assessment predicted no significant effects on all ornithological features, including goshawk, the only Important Ornithological Feature (IOF) identified. Following further assessment of cumulative effects on goshawk, no significant effects were predicted.
- 7.2.3. Following survey and assessment, no significant effects are anticipated upon ornithological features. However, additional controls will be put in place during construction through creation of a site-specific Construction Environment Management Plan (CEMP), Species Protection Plan (SPP) and appointing an Environmental Clerk of Works (ECoW) to monitor adherence to such plans.

Contents of Chapter

- 7.2.4. This ornithological chapter of the EIAR has been prepared by Natural Power Consultants Ltd (Natural Power) on behalf Vattenfall (the Applicant) in respect of the Proposed Development. The Proposed Development comprises up to 11 wind turbines and associated infrastructure and is located south-east of the B741, south of Dalmellington and south-west of New Cumnock, in East Ayrshire (See Figure 1.1: Site Location, Volume 2a of the EIAR). The Proposed Development lies within the East Ayrshire Council (EAC) Local Planning Authority (LPA) area.
- 7.2.5. This chapter provides details of the baseline ornithological conditions within the Proposed Development Area and the immediate surrounding environment. Baseline ornithological conditions have been established for avian fauna through a programme of rigorous ornithological field surveys, in addition to a desk-based review to obtain additional relevant ornithological data. The identified species comprising the ornithological baseline are described and assessed using recognised criteria, in accordance with industry guidelines (e.g. that produced by the Chartered Institute of Ecology and Environmental Management (CIEEM)¹).

- 7.2.6. This EIAR chapter has been prepared following a scoping process which led to a scoping report² issued to consultees in February 2022 and a formal scoping opinion received on 29 June 2022 (Technical Appendix 1.2 of the EIAR).

- 7.2.7. In line with the principles of proportionate EIA, embedded mitigation is considered at the outset of the assessment (See Section 7.7 of this chapter). Furthermore, to ensure proportionality based on the likelihood of effects, only ornithological features for which it is considered there may be significant effects in the absence of mitigation are identified as IOFs and are taken forward for a full EclA.

- 7.2.8. This chapter refers to the following:

Chapters (Volume 1)

- Chapter 2: Site selection and design evolution;
- Chapter 3: Project Description; and
- Chapter 6: Ecology.

Appendices:

- Technical Appendix 6.2: Outline Biodiversity Enhancement and Restoration Plan (BERP);
- Technical Appendix: 7.1: Ornithology and
- Technical Appendix: 7.2: Confidential Ornithology.

Figures (Volume 2a):

- Figure 7.1: Vantage Point (VP) Locations and Viewsheds;
- Figure 7.2: Ornithology Survey Areas;
- Figure 7.3: Statutory and Non-Statutory Designated Sites;
- Figure 7.4: Breeding Season VP Survey Results 2021;
- Figure 7.5: Breeding Season VP Survey Results 2022;
- Figure 7.6: Non-Breeding Season VP Survey Results (2021/2022);
- Figure 7.7: Non-Breeding Season VP Survey Results (2022/2023); and
- Figure 7.8: Moorland Breeding Bird Survey Results 2021 and 2022.

- 7.2.9. All Latin names for species mentioned in this chapter are listed in Technical Appendix 7.1: Ornithology, Volume 3 of the EIAR. Summaries of survey times and dates are also given in Technical Appendix 7.1: Ornithology. Full survey data, including details of survey dates, times and weather conditions, plus results data, can be provided on request.

7.3. Legislation, Policy and Guidance

- 7.3.1. The ornithological baseline surveys and subsequent assessment have been carried out with reference to a number of national policy documents, as addressed in Chapter 4: Climate Change, Legislative and Policy Context and Chapter 6: Ecology and Biodiversity, Volume 1 of the EIAR.
- 7.3.2. Legislation, policy and guidance documents with specific relevance to ornithology are:

¹ CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*. Chartered Institute of Ecology and Environmental Management, Winchester.

² Natural Power (2021). *South Kyle II Wind Farm Scoping Report*. The Natural Power Consultants on behalf of Vattenfall Wind Power Ltd.

Legislation

- Directive 2009/147/EC on the Conservation of Wild Birds (the Birds Directive)³.
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive)⁴;
- The Conservation of Habitats and Species (Amendment) Regulations 2017, relating to reserved matters in Scotland⁵;
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations), which transposes the Habitats Directive into UK law⁶;
- Wildlife and Countryside Act (WCA) 1981 (as amended)⁷;
- The Nature Conservation (Scotland) Act 2004⁸;
- The Wildlife and Natural Environment (Scotland) Act 2011⁹;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017¹⁰; and
- Convention on Wetlands of International Importance (‘Ramsar convention’)

Policy and Guidance

- European Union (EU) Exit: The Habitats Regulations in Scotland¹¹;
- National Planning Policy Framework 4 (NPF4) – particularly Policy 3¹²;
- Planning Advice Note (PAN) 51: Planning, Environmental Protection and Regulation¹³;

- PAN 60: Planning for Natural Heritage¹⁴;
- PAN 1/2013 – Environmental Impact Assessment¹⁵;
- East Ayrshire Local Development Plan¹⁶
- Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives: Scottish Executive Circular 6/1995 as amended¹⁷;
- Guidelines for Ecological Impact Assessment in the UK and Ireland¹;
- Recommended bird survey methods to inform impact assessment of onshore wind farms¹⁸;
- Birds and Wind Farms: Risk Assessment and Mitigation¹⁹;
- Using a collision risk model to assess bird collision risks for onshore wind farms²⁰;
- Guidance on using an updated collision risk model to assess bird collision risk at onshore wind farms²¹;
- Avoidance rates for the onshore Scottish Natural Heritage (SNH; now NatureScot) wind farm collision risk model²²;
- Disturbance Distances in selected Scottish Bird Species – NatureScot Guidance²³;
- Good Practice during Wind Farm Construction²⁴;
- British Standard 42020:2013 Biodiversity – code of practice for planning and development²⁵;
- Natural Heritage Zone (NHZ) bird population estimates. Scottish Windfarm Bird Steering Group (SWBSG). Commissioned report number 1504²⁶;

³ UK. Directive 2009/147/EC of the European Parliament and of the Council (2009). Available from - <https://www.legislation.gov.uk/eudr/2009/147/contents> [Accessed: 25/09/2024]

⁴ EUR-Lex, (2013). Available from - <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31992L0043> [Accessed: 25/09/2024]

⁵ UK. The Conservation of Habitats and Species Regulations (2017). Available from - <https://www.legislation.gov.uk/ukxi/2017/1012> [Accessed: 25/09/2024]

⁶ UK. The Conservation (Natural Habitats, &c.) Regulations (1994). Available from - <https://www.legislation.gov.uk/ukxi/1994/2716/contents/made> [Accessed: 25/09/2024]

⁷ UK. Wildlife and Countryside Act (1981). Available from - <https://www.legislation.gov.uk/ukpga/1981/69> [Accessed: 25/09/2024]

⁸ Scotland. Nature Conservation (Scotland) Act (2004). Available from - <https://www.legislation.gov.uk/asp/2004/6/contents> [Accessed: 25/09/2024]

⁹ Scotland. The Wildlife and Natural Environment (Scotland) Act (2011). Available from - <https://www.legislation.gov.uk/asp/2011/6/contents/enacted> [Accessed: 25/09/2024]

¹⁰ Scotland. The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations (2017). Available from - <https://www.legislation.gov.uk/ssi/2017/101/contents/made> [Accessed: 25/09/2024]

¹² Scottish Government. (2023). *National Planning Framework 4*. Scottish Government, Edinburgh.

¹³ Scotland. Scottish Government (2006). *PAN 51. Planning, Environmental Protection and Regulation*. Scottish Government, Edinburgh.

¹⁴ Scotland. Scottish Government (2000 (Updated 2006)). *PAN 60: Planning for Natural Heritage*. Scottish Government, Edinburgh.

¹⁵ Scotland. Scottish Government. (2013 (updated 2017)). *PAN 1/2013 – Environmental Impact Assessment*. Scottish Government, Edinburgh.

¹⁶ East Ayrshire Adopted Local Development Plan 2 (July 2024). Available at: <https://www.east-ayrshire.gov.uk/PlanningAndTheEnvironment/development-plans-and-policies/ldp2/ldp2.aspx> [Accessed 04/10/2024]

¹⁷ Scotland. Scottish Executive (1995 (updated 2000)). *Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives*. Scottish Executive, Rural Affairs Department, Edinburgh.

¹⁸ SNH (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms*. Scottish Natural Heritage (now NatureScot), Battleby.

¹⁹ De Lucas, M., Janss, G. & Ferrer, M. (eds.) (2007). *Birds and Wind Power*. Quercus, Madrid.

²⁰ Band, W. (2024). *Using a collision risk model to assess bird collision risks for onshore wind farms*. NatureScot Research Report 909.

²¹ NatureScot (2024). *Guidance on using an updated collision risk model to assess bird collision risk at onshore wind farms*. Available from - <https://www.nature.scot/doc/guidance-using-updated-collision-risk-model-assess-bird-collision-risk-onshore-wind-farms> [Accessed: 18/03/2025]

²² SNH (2018) *Avoidance rates for the onshore SNH wind farm collision risk model*. Scottish Natural Heritage (now NatureScot), Battleby.

²³ NatureScot (2022). *Disturbance Distances in selected Scottish Bird Species – NatureScot Guidance*. Available from - <https://www.nature.scot/doc/disturbance-distances-selected-scottish-bird-species-naturescot-guidance> [Accessed: 24/04/2024]

²⁴ Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland and Historic Environment Scotland (2015). *Good practice during windfarm construction*. Available from - <https://www.nature.scot/sites/default/files/2018-08/Guidance%20-%20Good%20Practice%20during%20wind%20farm%20construction.pdf> [Accessed: 03/10/2023]

²⁵ The British Standards Institution (BSI) (2013). *Biodiversity – Code of practice for planning and development*. BSI Standards Limited, London.

²⁶ Wilson, M.W., Austin, G.E., Gillings, S. & Wernham, C.V. (2015). *Natural Heritage Zone bird population estimates. SWBSG commissioned report number 1504*. pp72.

- Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas²⁷;
- Monitoring the impacts of onshore wind farms on birds²⁸;
- Guidance on methods for monitoring bird populations at onshore wind farms²⁹;
- Assessing the cumulative impact of onshore wind farms on birds³⁰;
- Assessing connectivity with Special Protection Areas (SPAs)³¹;
- Birds of Conservation Concern (BoCC) 5: The population status of birds in the United Kingdom, Channel Islands and the Isle of Man³²; and
- Scottish Biodiversity List (SBL)³³.

7.4. Method of Assessment

Data Collection

Desk Study

- 7.4.1. A desk study was undertaken to collate relevant existing ornithological survey data, public domain survey data, and to obtain historical records of protected and relevant species from within the Proposed Development Area and the surrounding environment. This provided background information on the ornithological features that are potentially present, to help inform and guide the baseline ornithological field surveys and it also provides context to their results. Combined with the results of the ornithological field surveys, this information has been utilised to provide a comprehensive baseline on which to base the EclA.

Existing Historic Records

- 7.4.2. A search was conducted for historical data for the following surveys undertaken for developments adjacent to and surrounding the Proposed Development including South Kyle Wind Farm, South West Scotland Interconnector Project, Windy Standard Complex, and Afton Wind Farm between 1993 and 2021;
- Flight activity (Vantage Point (VP)) surveys;
 - Moorland breeding bird surveys (MBBS);
 - Woodland breeding bird surveys;
 - Raptor walkovers;
 - Black grouse surveys;
 - Forest owl, woodcock and nightjar surveys;

- Winter walkovers.

- 7.4.3. Details of surveys and years completed for all developments mentioned above are provided in Technical Appendix 7.1: Ornithology, Volume 3 of the EIAR.

Statutory, National and Locally Designated Sites of Nature Conservation

- 7.4.4. A web-based search was undertaken to identify and provide information on statutory designated sites of nature conservation, with avian species as listed features. The search was carried out using the Multi-Agency Geographic Information for the Countryside (MAGIC) Map application tool³⁴, the NatureScot SiteLink website³⁵. The search focussed on identifying the following sites:
- SPAs – within 10 km of the Proposed Development Area (and within 25 km for sites designated for geese and gulls);
 - Ramsar sites (Ramsar Convention on Wetlands of International Importance) where waterfowl or waterfowl habitat are described as ecological features – within 10 km of the Proposed Development Area (and 25 km for geese and gulls);
 - Sites of Special Scientific Interest (SSSIs) – within 5 km of the Proposed Development Area;
 - Local Nature Conservation Sites (LNCS) within 5 km of the Proposed Development Area; and
 - Local and National Nature Reserves (LNRs/NNRs; including Royal Society for the Protection of Birds (RSPB) and the Scottish Wildlife Trust (SWT) reserves, and Important Bird Areas (IBAs)) – within 5 km of the Proposed Development Area.
- 7.4.5. LNRs and LNCSSs (which are non-statutory sites that are predominantly designated for their habitat or overall biodiversity assemblage and not specifically for their ornithological interest) were searched for indications of ornithological use. However, since these sites are non-statutory and numerous in the vicinity of the Proposed Development, sites that overlap with the Proposed Development Area and a precautionary 5 km search radius around the Proposed Development were focussed on during the search.
- ### Ornithological Features of Conservation Concern
- 7.4.6. A data search from The South West Scotland Environmental Information Centre (SWSEIC) and the RSPB requested all ornithological records held within the Proposed Development Area and a 5 km buffer for all Schedule 1, Annex I, UK BoCC Red List and Amber List, and SBL-listed species since 2013. The data search was extended to within 10 km of the Proposed Development Area for eagles and 25 km for geese and swans.
- 7.4.7. Further records of Schedule 1 and/or Annex I nesting and roosting raptors within 10 km of the Proposed Development Area since 2013 were requested from the South Strathclyde and Dumfries and Galloway Raptor Study Groups (SSRSG and DGRSG, respectively).

²⁷ SNH (2018). *Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas*. Scottish Natural Heritage (now NatureScot), Inverness.

²⁸ SNH (2009). *Monitoring the impact of onshore wind farms on birds (Guidance note)*. Scottish Natural Heritage (now NatureScot), Edinburgh.

²⁹ SNH (2009). *Guidance on methods for monitoring bird populations at onshore wind farms*. Scottish Natural Heritage (now NatureScot), Edinburgh.

³⁰ SNH (2018). *Assessing the cumulative impacts of onshore wind farms on birds: guidance*. Scottish Natural Heritage (now NatureScot), Inverness.

³¹ SNH (2016) *Assessing connectivity with Special Protection Areas (SPAs) (Guidance note: Version 3)*. Scottish Natural Heritage (now NatureScot), Edinburgh.

³² Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021). *Birds of Conservation Concern 5: the population status of birds in the United Kingdom, Channel Islands and Isle of Man*. British Birds 114, 723–747.

³³ Scottish Government (2020). *Scottish Biodiversity List*. Available from - <https://www.nature.scot/doc/scottish-biodiversity-list> [Accessed: 03/10/2023]

³⁴ MAGIC. (2022). Available from - <https://magic.defra.gov.uk/MagicMap.aspx> [Accessed: 19/05/2023]

³⁵ NatureScot SiteLink (n.d.) Available from - <https://sitelink.nature.scot/home> [Accessed: 03/10/2023]

7.4.8. Ornithology Chapters of other wind farm developments in the vicinity of the Proposed Development were consulted for any relevant information in relation to ornithological features.

Target Species

7.4.9. NatureScot guidance¹⁸ suggests that assessment of the effects of wind farms on birds should, in most circumstances, be limited to those protected species and other species of conservation concern that, as a result of their flight patterns or response behaviour, are likely to be affected by, or subject to, significant and adverse impacts from wind farms. The guidance states that there are three overarching lists describing protected species and species of conservation concern:

- Species listed in Annex I of the Council Directive 2009/147/EC on the Conservation of Wild Birds (Annex I species)³;
- Species protected under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) (Schedule 1 species)⁷; and
- Red-listed Birds of Conservation Concern as identified in UK BoCC³² (Red listed species).

7.4.10. Within these lists, NatureScot recommends that the greatest attention should be paid to those species which as a result of their flight patterns or response behaviour, may be subject to impact from wind farms (such as raptors) and any species that are not particularly manoeuvrable in flight (e.g. geese and swans). Such species are termed ‘target species’ and are recorded in detail during flight activity surveys.

7.4.11. In accordance with NatureScot guidance¹⁸, surveys focused on the following target species:

- All raptors and owls listed in Schedule 1 and 1A of the WCA 1981 (as amended);
- All species of wildfowl (with the exception of Canada goose and mallard);
- All wader species;
- All gull species; and
- Black grouse.

7.4.12. Secondary species³⁶ (species of lesser conservation concern) which were surveyed are:

- All other raptor and owl species (including buzzard, sparrowhawk and tawny owl);
- All other waterfowl (e.g. grey heron and cormorant);
- Raven;
- Red grouse;
- Schedule 1 passerines (e.g. crossbill); and
- Any large aggregations of UK BoCC Red-listed passerines.

7.4.13. Proposed wind farm sites may differ considerably in their ornithological sensitivity; NatureScot guidance therefore recommends that survey programmes and the level of survey effort should be tailored to an individual site’s needs.

Field Surveys

7.4.14. A summary of the baseline ornithology surveys undertaken in line with NatureScot guidance¹⁸ at the Proposed Development (dates and extent of the area surveyed) is provided in Table 7.1 below. The first year of breeding season surveys were completed by Mackenzie Bradshaw Environmental Consulting (MBEC), with results summarised in the 2021 Ornithological Survey Report³⁷. Results of baseline ornithology surveys undertaken by MBEC are summarised alongside those undertaken by Natural Power.

7.4.15. Details of survey extents can be found in Figure 7.1: Vantage Point Locations and Viewsheds, Volume 2a, and Figure 7.2: Ornithology Survey Areas, Volume 2a. Areas where access was not available during surveys is also shown in Figure 7.2: Ornithology Survey Areas. Where access was not available visual surveys were conducted from the nearest location within the Proposed Development Area. Further survey method details, along with dates of survey visits and analysis methods are given in Technical Appendix 7.1: Ornithology, Volume 3 of the EIAR. Full survey details including survey timings and weather conditions can be provided on request.

Table 7.1: Summary of baseline ornithology surveys undertaken at the Proposed Development

Survey	Dates	Notes
Breeding season Vantage Point (VP) surveys	April to August 2021* and March to August 2022**	Details on VP surveys provided below.
Non-breeding season VP surveys	September 2021 to February 2022** and September 2022 to February 2023**	Details on VP surveys provided below.
Moorland breeding bird surveys (MBBS) ³⁸	April to July 2021* and April to July 2022**	Proposed Development Area plus 50 m buffer (Survey Area)
Breeding raptor surveys ^{39,40}	April to August 2021* and March to August 2022**	Proposed Development Area plus 2 km buffer (Survey Area)
Black grouse surveys ^{39,41}	April and May 2021* and 2022**	Proposed Development Area plus 1.5 km buffer (Survey Area)

Source: *MBEC; **Natural Power

Vantage Point Surveys (Flight Activity Survey)

7.4.16. The flight activity survey focuses on identifying flight lines and flight heights of target species and allows any regular patterns of flight lines to be identified, allowing turbine locations to be designed to minimise collision risk to birds, if necessary. The data generated can also be used to estimate the theoretical collision risk of a particular species. This is achieved by noting the flight heights at which the birds are recorded during the period of observation. The time and duration of the flight were recorded, and the altitude of the target bird(s) was recorded at the start of the observation and at 15 second intervals thereafter into one of three height bands (subsequently referred to as height bands 1, 2 and 3);

³⁶ Secondary species are species which may also be sensitive to wind farm development, but which are of lesser conservation concern or lower sensitivity than target species. These species are recorded during flight activity surveys but in less detail than target species (for example their flights are not mapped and so collision risk modelling cannot be undertaken for secondary species).

³⁷ MBEC (2021). *South Kyle II Wind Farm: 2021 Ornithological Survey Report*. MBEC on behalf of Vattenfall Wind Power Ltd.

³⁸ Brown, A. F. & Shepherd, K. B. (1993). *A method for censusing upland breeding waders*. Bird Study, 40: 189-195.

³⁹ Gilbert, G., Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Sandy.

⁴⁰ 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.

⁴¹ Etheridge, B. & Baines, D. (1995). *Instructions for the Black Grouse Survey 1995/6: a Joint RSPB/GCT/JNCC/SNH Project*. Unpublished.

1. Height band 1: <10 m;
2. Height band 2: 10 m to 210 m; and
3. Height band 3: >210 m.

- 7.4.17. The ornithological features recorded during the VP surveys (classed as 'target' species) are described in the baseline survey results sections. 'Secondary' species were also recorded in accordance with NatureScot guidance¹⁸.
- 7.4.18. All incidental records of target species (i.e., birds that were not in flight, birds that were heard but not seen, birds that were observed well beyond the survey area and records outside of the formal VP surveys) were also recorded to provide context, although these records do not contribute to Collision Risk Modelling (CRM).

Collision Risk Modelling

- 7.4.19. CRM uses data collected during flight activity surveys to predict the number of individuals per target species that have the potential to collide with the wind turbine rotors. This is undertaken when sufficient flight activity occurs within the Collision Risk Zone (CRZ) at Potential Collision Height (PCH) (i.e. the height at which rotor blades sweep), as per the Band (2024)²⁰ collision risk model recommended by NatureScot²¹. For the purposes of this assessment, sufficient flight activity was defined as three or more flights, or more than 10 individuals, at PCH in the CRZ within a season. Thus, species that rarely pass through the study area and which are not considered to be at risk of significant effects did not undergo CRM.
- 7.4.20. For the purposes of this EIA, flights which pass through or touch a 285 m buffer of the proposed turbine locations are considered to be in the CRZ, based upon a blade length of 85 m plus a precautionary 200 m buffer. CRM was run based on a layout of 11 turbines of 200 m height (to blade tip), with blade lengths of 85 m and a hub height of 115 m. Therefore, for the purposes of the EIA, the turbine swept height shall be between 30 m and 200 m altitude.
- 7.4.21. For species which qualified for CRM, all flights within the CRZ were included within the CRM to calculate bird density. Using the height bands recorded during the VP surveys, the proportion of flights in height band 2 (10 m - 210 m) was used to calculate collision risk. This will be a precautionary approach as some flights at the lower and upper ends of height band 2 will lie outside the actual PCH. Flights recorded in height band 1 and height band 3 are below and above PCH, respectively.
- 7.4.22. For species that usually fly in approximately straight lines ('directional approach'), such as transiting gulls, the number of observed flights through the VP viewsheds are used to calculate bird density per season and year. For species that generally fly non-directionally ('random approach'), such as foraging raptors, the observed time spent flying within the VP viewsheds used to calculate bird density per season and year. Bird density is then used in the Band model²⁰ to calculate collision risk. Collision estimates are calculated based on a range of avoidance rates including recommended species-specific avoidance rates (SNH, 2018)²².
- 7.4.23. For each species, the risk of collision for an individual is calculated by estimating the likelihood of collision based on the characteristics of the birds and of the turbines. Further details of the methods used in CRM, including parameters used in the model are provided in Technical Appendix 7.1: Ornithology, Volume 3 of the EIAR.

Survey Limitations

- 7.4.24. There were limiting factors to survey methodologies, the details of which are provided in this section. As a whole, it is not considered that these limitations have resulted in an impact on the assessment provided within this chapter, and the reasoning for this in relation to each limitation is provided on a case-by-case basis below.

Weather Conditions

- 7.4.25. Weather conditions during the VP surveys were not always optimal, with occasional periods of heavy rain, strong winds, snow and moderate visibility (1-2 km) reported. Occasional rain and moderate visibility were also reported during the MBBS and breeding raptor surveys. However, it is not always possible to avoid poor weather conditions and surveying in a range of weather conditions is considered give an accurate representation of the environment within and surrounding the Proposed Development. It is therefore considered that occasional periods of poor weather is not a significant limitation to the dataset obtained.

Access

- 7.4.26. No access was available to land beyond the north eastern boundary of the Proposed Development Area. Therefore, the survey areas which fell outside of the Proposed Development Area, comprising a 500 m buffer for MBBS, 1.5 km buffer for black grouse surveys and 2 km buffer for breeding raptor and owl surveys, were surveyed via short ad-hoc VPs from locations along the northeastern boundary of the Proposed Development Area. As far as possible, these VPs overlooked visible suitable habitat, including woodland and moorland habitat, within the relevant survey buffers. Areas where access was not permitted are shown in Figure 7.2: Ornithology Survey Areas, Volume 2a of the EIAR.
- 7.4.27. Existing historic data collected during baseline surveys of developments surrounding the Proposed Development between 1993 and 2021 (see Sections 7.4 and 7.6) was consulted for records of target species. As such, the inclusion of these concise datasets in combination with additional historic records provided by the RSPB, SWSEIC SSRSG, and DGRSG, allowed for a robust assessment of effects.

Survey Effort

- 7.4.28. The 2021 breeding season surveys did not begin until April 2021 due to delays in obtaining access to the Proposed Development Area³⁷. NatureScot guidance¹⁸ recommends that breeding season VP surveys and breeding raptor surveys commence in March. However, additional hours of survey were completed at each VP to account for this, totalling a minimum of 36 hours of VP survey per VP during the breeding season. As for breeding raptor surveys, an additional visit was completed in April, with a minimum of six survey visits completed between April and July³⁷. As such, a delay in the commencement of the 2021 breeding season surveys is not considered to be a significant limitation to the dataset.
- 7.4.29. The non-breeding season VP surveys did not commence until October 2021 due to delays during handover of baseline surveys from MBEC to Natural Power following the 2021 breeding season surveys. Therefore, no VP surveys were completed in September 2021. However, an additional six hours of survey were completed at each VP in October 2021 to account for this. Additionally, three hours of survey were completed at VP1 in December 2021, with three additional hours of survey completed in January 2022. As a minimum of 36 hours of VP survey was completed per VP during the non-breeding season, this is not considered to be a significant limitation to the dataset.
- 7.4.30. Details of the full VP survey effort is provided in Table 7.1.5, Technical Appendix 7.1: Ornithology, Volume 3 of the EIAR.

Changes to Proposed Development Area

- 7.4.31. The Proposed Development Area was updated in May 2022 following completion of the baseline ornithology surveys. The baseline ornithology surveys were undertaken on the original Proposed Development Area which does not cover the entirety of the updated area. However, the baseline surveys covered all areas where infrastructure is proposed and as such, the results remain appropriate for this ornithological assessment. These

changes are therefore not considered to be a limitation. Details on site boundary and layout changes are provided in Chapter 2: Site selection and design evolution.

Approach to Impact Assessment

7.4.32. This section presents the approach taken to the EIA and provides an overview of how the potential for impact has been determined and the method by which impact significance has been ascertained. The approach to the EIA adopted within this assessment follows the CIEEM guidelines¹, and in line with these guidelines professional judgement has been applied where appropriate. The criteria used and the underlying rationale are described further within the following sections.

Determining Important Ornithological Features

7.4.33. The assessment process involves identifying IOFs, in accordance with CIEEM guidelines¹. These ornithological features and their values are determined by the criteria defined in Table 7.2.

Table 7.2: Approach used to evaluate ornithological features by defined geographical context

Level of value	Example of IOF
International	A regularly occurring species listed as a qualifying feature of an internationally designated site (e.g. SPA or Ramsar wetland site) within the Zone of Influence (Zol) of the Proposed Development and found in numbers that are crucial to the integrity of the designated site. Species populations present with sufficient conservation importance to meet criteria for SPA selection ⁴² .
National	A regularly occurring species listed as a qualifying feature of a nationally designated site (e.g. SSSI) within the Zol of the Proposed Development. Species populations present with sufficient conservation importance to meet criteria for SSSI selection ^{43,44,45} .
Regional	A species occurring within SPAs, Ramsar sites and SSSIs, but not crucial to the integrity of the site. Species populations present falling short of SSSI selection criteria but with sufficient conservation importance to likely meet criteria for selection as a local site ⁴³ .
Local	Species described above but which are present very infrequently or in very low numbers. Other species of conservation concern, including species included on the UK BoCC Red and Amber Lists ³² .

⁴² An area that is used regularly by 1% or more of the Great Britain population of a species listed in Annex I of the Birds Directive (79/409/EEC as amended) in any season; an area is used regularly by 1% or more of the biogeographical population of a regularly occurring migratory species (other than those listed in Annex I) in any season; an area that is used regularly by over 20,000 waterfowl (waterfowl as defined by the Ramsar Convention) or 20,000 seabirds in any season.

⁴³ Drewitt, A.L., Whitehead, S. and Cohen, S. (2020). *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups*. Chapter 17 Birds (version 1.1). Joint Nature Conservation Committee, Peterborough.

⁴⁴ Areas which regularly support 1% or more of the total British breeding population of any native species (as per Woodward *et al.*, 2020), including lekking and feeding areas and seabird colonies of over 10,000 breeding pairs;

Level of value	Example of IOF
Negligible	All other species that are widespread and common and which are not present in locally important (or greater) numbers, and which are considered to be of low conservation concern (e.g. UK BoCC Green List species) ³² .

7.4.34. The assessment of ornithological features recorded during the baseline surveys also considers the importance of the site for the species under consideration, rather than only considering the nature conservation importance of the species itself. As such, a species of international conservation importance may only have local or negligible importance in the context of the Proposed Development if very rarely recorded at the site.

7.4.35. Therefore, while the importance of the species is considered, in order to assess the nature conservation importance of the Proposed Development, the number of individuals of that species using it and the nature and level of this use are also taken into account. An assessment is then made of the importance of the area of the Proposed Development to the species in question, in order to determine whether they are an IOF.

7.4.36. In line with the principles of proportionate EIA, embedded mitigation is considered at the outset of the assessment. IOF status has only been assigned where there is still considered to be the potential for significant effects on the feature at the assigned value level arising from the Proposed Development, after the application of embedded measures.

Characterising Potential Effects on Ornithological Features

7.4.37. Impacts on IOFs are judged in terms of magnitude and duration. Magnitude refers to the size of an impact and is determined on a quantitative basis where possible. This may relate to the area of habitat lost to the development footprint in the case of a habitat feature or predicted loss of individuals in the case of a population of a particular species of bird. Within this EclA, magnitude is assessed within six levels, as detailed in Table 7.3.

Table 7.3: Approach used to evaluate ornithological features by defined magnitude

Impact magnitude	Description
Very highly negative	Total or almost complete loss of an ornithological feature resulting in a permanent adverse effect on the integrity ⁴⁶ of the feature. The conservation status of the feature would be permanently affected.
Highly negative	Result in large-scale, permanent changes in an ornithological feature, likely to change its ecological integrity. These impacts are therefore likely to result in overall changes in the conservation status of the feature.
Moderately negative	Includes moderate-scale long-term changes in an ornithological feature, or larger-scale temporary changes; however, the integrity of the feature is not likely to be

areas which regularly support 1% or more of the total British non-breeding population of any native species in any season and non-breeding waterbird assemblages of over 20,000 individuals (as per Woodward *et al.*, 2020).

⁴⁵ Woodward, I., Aebischer, N., Burnell, D., Eaton, M., Frost, T., Hall, C., Stroud, D.A. & Noble, D. (2020). *Population estimates of birds in Great Britain and the United Kingdom*. British Birds 113: 69–104.

⁴⁶ Note that integrity in this context refers to ecological integrity of a population of a species at a defined value level, i.e. the maintenance of the conservation status of a population of a species at a specific location or geographic scale. This should not be confused with the specific term 'Site Integrity' used in Appropriate Assessment for Natura 2000 sites.

Impact magnitude	Description
	affected. This may result in temporary changes in the conservation status of the feature, but these are reversible and unlikely to be permanent.
Low negative	Includes impacts that are small in magnitude, with small-scale temporary changes, and where integrity of an ornithological feature is not affected. These effects are unlikely to result in overall changes in the conservation status of the feature.
Negligible	No perceptible change in an ornithological feature.
Positive	The changes in an ornithological feature are considered to be beneficial to its ecological integrity or nature conservation status.

7.4.38. In the case of designated sites, spatial magnitude is assessed in respect of the area within the Proposed Development Area or using a scale at which the designated features can be regarded as having potential connectivity with the Proposed Development. For non-designated sites, spatial magnitude is assessed at an appropriate scale depending on the feature’s importance.

Impacts and spatial magnitude are assessed within an appropriate bio-geographic scale:

- Impacts on breeding bird populations are assessed in a regional context; and
- Impacts on non-breeding bird populations are assessed in a national context.

7.4.39. The assessment also considers whether the impact is positive or negative, short-term (for example only during construction) or long-term (throughout the lifetime of the Proposed Development), reversible or permanent. This is summarised in Table 7.4.

Table 7.4: Criteria for describing duration

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

7.4.40. Knowledge of how rapidly the population or performance of a species is likely to recover following loss or disturbance (e.g. by individuals being recruited from other populations elsewhere) is used to assess duration, where such information is available.

7.4.41. In addition, birds are assessed with consideration for their behavioural sensitivity and ability to recover from temporary negative conditions. Behavioural sensitivity is determined subjectively based on the species’ ecology and behaviour, using the broad criteria set out in Table 7.5.

7.4.42. The judgement takes account of information available on the responses of birds to various stimuli (e.g. predators, noise and disturbance by humans).

Table 7.5: Criteria for describing sensitivity

Sensitivity	Definition
High	Species or populations occupying habitats remote from human activities, or that exhibit strong and long-lasting (guide: > 20 minutes) reactions to disturbance events.
Moderate	Species or populations that appear to be warily tolerant of human activities, or that exhibit short-term reactions (guide: 5 minutes - 20 minutes) to disturbance events.
Low	Species or populations occupying areas subject to frequent human activity and exhibiting mild and brief reaction (including flushing behaviour) to disturbance events.

7.4.43. It should be noted that behavioural sensitivity can differ between similar species and between different populations of the same species. Thus, the behavioural responses of birds are likely to vary with both the nature and context of the stimulus and the experience of the individual bird. Sensitivity also depends on the activity of the bird, for example, a species is likely to be less adaptable to disturbance whilst breeding than at other times. In addition, individual birds of the same species will differ in their tolerance depending on the level of human disturbance that they regularly experience in a particular area and have become habituated to (e.g. individuals that live in an area with high levels of urban activity and associated disturbance are likely to have a greater tolerance than those that occupy remote locations with little or no human disturbance). However, tolerance is likely to increase as breeding progresses.

Determining Significance of Potential Ornithological Effects

7.4.44. Only features for which there is considered to be the potential for significant effects are identified as IOFs and taken forward for EclA. Having followed the process of identifying an IOF, determining its sensitivity, and characterising potential impacts, the significance of the effect is then determined. The CIEEM guidelines¹ use only two categories to classify effects: ‘significant’ or ‘not significant’. In this EIA Chapter, significance of effects is assessed following an assumption of the application of embedded mitigation measures (See Section 7.7). The significance of an effect is determined by considering the importance of the feature, the magnitude of the impact and applying professional judgement as to whether the integrity of the feature will be affected. The assessment includes potential impacts on each IOF from all phases of the development, e.g. construction, operation and decommissioning, and considers direct, indirect, secondary and cumulative impacts and whether the impacts and their effects are short, medium, long-term, permanent, temporary, reversible, irreversible, positive and/or adverse.

7.4.45. In this assessment, an effect that threatens the integrity of a feature is considered to be significant. It should be noted that, alongside the criteria provided, professional judgement is applied in determining the potential for a likely significant effect.

7.4.46. Where appropriate, mitigation and/or compensation measures, including the design process, are identified in order to avoid and reduce likely significant effects. It is also good practice to propose mitigation measures to reduce negative effects that are not significant. The significance of residual effects on features after the effects of mitigation have been considered can then be determined, along with any monitoring requirements²⁹. A level of certainty has been provided in relation to the success of the recommended mitigation. This has been given as a rate of confidence in the prediction, varying from high to low. Certainty associated with a design will vary according to a number of factors. Professional judgement is applied in assessing the level of certainty, and this will take into account the following points:

- Technical feasibility of what is proposed – using experience from projects where a similar measure has been carried out;
- Overall quantity of what is proposed – is it large enough to be viable? Is it of equivalent function to any habitat lost?;
- Overall quality of what is proposed – does it compare favourably with features lost or damaged?;
- Level of commitment – is there a realistic understanding of the resources and effort required to achieve predicted outcomes?;
- Provision of long-term management; and
- Timescale for predicted benefits.

Cumulative Impact Assessment

- 7.4.47. The Cumulative Impact Assessment (CIA) identifies any other projects which, in combination with effects from the Proposed Development could give rise to significant cumulative impacts on ornithological features. Cumulative effects are particularly important as ornithological features may be already exposed to background levels of threat or pressure and may be close to critical thresholds where further impacts could cause irreversible decline. Cumulative effects can also make habitats and species more vulnerable or sensitive to change.
- 7.4.48. Cumulative effects can either be additive / incremental (i.e. multiple activities/projects may give rise to a significant effect due to their proximity in time and space) and connected (i.e. different aspects of the same project which may be authorised under different consent processes).

Trends and Predicted Future Baseline

- 7.4.49. Current habitat use within the Proposed Development Area comprises largely of commercial conifer plantation forestry. There is also a quarry and small areas of moorland habitat. In the absence of development, it is assumed that the habitat use within the Proposed Development Area would remain the same for the foreseeable future.
- 7.4.50. It is more difficult to predict changes that may occur in the longer-term (i.e. over 25 years). Climate change and the shift in species and habitat distributions that this may cause, as well as potential land management changes that this may bring about, cannot be reliably predicted at this time. Baseline surveys carried out for the Proposed Development represent a snapshot of the ecology community present at the time and cannot be extrapolated to predict future population trends in the event of climate change, or a future change in land use at the Proposed Development.

7.5. Consultation

- 7.5.1. A Scoping Report was issued to consultees in February 2022². This document contained details of historic survey data obtained from baseline surveys of adjacent and surrounding developments, results of baseline surveys completed at the Proposed Development up to August 2021, and the proposed survey and assessment methodology for full EIA following 18 months of baseline surveys (comprising two breeding seasons and one non-breeding season). Following consultee responses (summarised in Table 7.6), the following statutory designated sites were scoped out and are not considered in the assessment:

- Muirkirk and North Lowther Uplands SPA⁴⁷;
- Muirkirk Uplands SSSI⁴⁸;
- Merrick Kells SSSI⁴⁹; and
- North Lowther Uplands SSSI⁵⁰.

7.5.2. All consultation considered to be relevant to this chapter is summarised in Table 7.6. The table does not repeat scoping responses listed in Table 6.5 in Chapter 6: Ecology and Biodiversity, Volume 1 of the EIAR.

Table 7.6: Consultee scoping responses relating to ornithology

Consultee	Comments/issues raised/recommendations	Addressed responses/outcomes
RSPB April 2022 Response to Scoping Report	Recommended inclusion of management prescriptions within the Habitat Management Plan (HMP) to improve habitat surrounding South Kyle for black grouse to maintain connectivity between populations.	Details of habitat management for black grouse are provided within the outline Biodiversity Enhancement and Restoration Plan (BERP) (Appendix X, Volume 3 of the EIAR).
NatureScot May 2022 Response to Scoping Report	Content with the VP coverage of the turbines and associated infrastructure and the ornithological features that have been considered in the baseline surveys. However, advised that two full years of baseline ornithology surveys should be carried out, including two years of non-breeding bird surveys.	Two full years of baseline surveys were completed (See Section 7.6).
	Advised that an Appropriate Assessment (AA) was not required for the Muirkirk Uplands and North Lowther Uplands SPA, due to a likely lack of connectivity with the Proposed Development and it could therefore be scoped out of the assessment.	The Muirkirk Uplands and North Lowther Uplands SPA was scoped out of the assessment.
	Advised that the Muirkirk Uplands, North Lowther Uplands and Merrick Kells SSSIs could be scoped out of the assessment due to distance from the Proposed Development.	All three SSSIs were scoped out of the assessment.
	Content that the baseline survey scope included black-headed gull as a target species and was sufficient to assess impacts on black-headed gull as a	Bogton Loch SSSI has been included within the assessment of potential IOFs (See Section 7.7).

⁴⁷ Muirkirk and North Lowther Uplands SPA. Available from - <https://sitelink.nature.scot/site/8616> [Accessed: 04/04/2024]

⁴⁸ Muirkirk Uplands SSSI. Available from - <https://sitelink.nature.scot/site/8166> [Accessed: 04/04/2024]

⁴⁹ Merrick Kells SSSI. Available from - <https://sitelink.nature.scot/site/1148> [Accessed: 04/04/2024]

⁵⁰ North Lowther Uplands SSSI. Available from - <https://sitelink.nature.scot/site/8161> [Accessed: 04/04/2024]

Consultee	Comments/issues raised/recommendations	Addressed responses/outcomes
	qualifying feature of the Bogton Loch SSSI.	
Crosshill Straiton and Kirkmichael Community Council May 2022 Response to Scoping Report	<p>There is a programme to re-introduce golden eagles to the South of Scotland and this should be taken into account. Limiting the range to 10 km for this species is rather low considering it flies considerable distances to obtain food.</p>	<p>Golden eagle was not recorded during any of the baseline surveys of the Proposed Development completed between April 2021 and February 2023 (inclusive). Golden eagle was also not recorded during baseline surveys of developments surrounding the Proposed Development (see Section 7.6).</p> <p>A single record of golden eagle observed in 2015 was returned following the data search (further details provided in Confidential Technical Appendix 7.2: Ornithology). This record was located approximately 11.6 km from the Proposed Development and associated infrastructure at the closest point, beyond the maximum foraging range for golden eagles during the breeding season⁵¹. As such, golden eagle has not been included in the feature assessment in Section 7.7.</p>
	The ospreys at Loch Doon have attracted many visitors to the area which has resulted in the expansion of local businesses (Roundhouse Café and a separate Caravan Site) and potential employment opportunities. Residents and visitors in our Community Council area also appreciate these spectacular birds. Given their importance, and the proximity to the Proposed Development, special attention should be given to them.	<p>Osprey was recorded during baseline surveys of developments surrounding the Proposed Development between 1993 and 2021 (see Section 7.6). However, osprey was not recorded during any of the baseline surveys of the Proposed Development completed between April 2021 and February 2023 (inclusive).</p> <p>A single known breeding territory was returned following the data search (further details provided in Confidential Technical Appendix 7.2: Ornithology). This breeding</p>

Consultee	Comments/issues raised/recommendations	Addressed responses/outcomes
	As mentioned previously the ospreys at Loch Doon require enhanced measures.	territory is located approximately 5.8 km from the Proposed Development at the closest point. Although osprey have a core foraging range of 10 km ³¹ , there is no suitable foraging habitat within the Proposed Development Area. As such, osprey has not been included in the feature assessment in Section 7.7.
	Highlighted that all Schedule 1-listed birds should be included as targets within pre-construction surveys, not just raptor species.	Pre-construction surveys will be carried out to detect all breeding birds and their nests within an appropriate buffer of the Proposed Development. The nests of all Schedule 1-listed species will be further protected through implementation of species-specific exclusion zones. Further details regarding embedded mitigation are provided in Section 7.7.
	In addition to the above we believe that The Environment Act 2021 ⁵¹ should be included in the list of documents mentioned in 5.2 [of the Scoping Report ²].	Aspects of the Environment Act 2021 that are applicable in Scotland are not relevant to the assessment of likely significant effects on ornithological interests and therefore this piece of legislation has not been considered in this chapter.

7.6. Baseline

7.6.1. This section presents the baseline environment for desk-based review and field surveys in relation to the Proposed Development.

Desk Study

Existing Historic Records

7.6.2. Historic records of target species recorded during surveys undertaken for South Kyle Wind Farm, South West Scotland Interconnector Project, Windy Standard Complex, and Afton Wind Farm between 1993 and 2021 are

⁵¹ UK. The Environment Act (2021). Available from - <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted> [Accessed: 04/04/2024]

provided in Table 7.7, below. Further details are provided in Table 7.1.3, Technical Appendix: Ornithology, Volume 3 of the EIAR.

Table 7.7: List of target species recorded during surveys undertaken for developments adjacent to and surrounding the Proposed Development between 1993 and 2021

Species*	Conservation status**
Barnacle goose	Annex I, Amber, SBL
Greylag goose	Amber
Bean goose (not identified to species level)	Red, SBL
Pink-footed goose	Amber
White-fronted goose	Red, SBL
Whooper swan	Schedule 1, Annex I, Amber, SBL
Black grouse	Red, SBL
Oystercatcher	Amber
Lapwing	Red, SBL
Golden plover	Annex I, SBL
Whimbrel	Schedule 1, Red
Curlew	Red, SBL
Black-tailed godwit	Schedule 1, Red, SBL
Snipe	Amber
Common sandpiper	Amber
Osprey	Schedule 1, Annex I, Amber, SBL
Goshawk	Schedule 1
Hen harrier	Schedule 1 and 1A, Annex I, Red, SBL
Red kite	Schedule 1 and 1A, Annex I, SBL
Barn owl	Schedule 1, SBL
Short-eared owl	Annex I, Amber, SBL
Merlin	Schedule 1, Annex I, Red, SBL
Peregrine	Schedule 1, Annex I, SBL
Crossbill	Schedule 1
Snow bunting	Schedule 1, Amber, SBL

Source: *Species listed in order of the British Ornithologists' Union (BOU) British List⁵²; **Annex I = listed on Annex I of the EU Birds Directive; Schedule 1 = listed on the WCA; Red/Amber = listed on the UK BoCC Red or Amber Lists; and SBL = listed on the SBL

Statutory, National and Locally Designated Sites of Nature Conservation

- 7.6.3. A single SSSI with designated ornithological features was located within 5 km of the Proposed Development Area: Bogton Loch SSSI⁵³, approximately 1.3 km to the west. The breeding bird assemblage which includes black-headed gull, willow tit, grasshopper warbler, song thrush, spotted flycatcher and reed bunting, is a qualifying feature of Bogton Loch SSSI.
- 7.6.4. No SPAs or Ramsar sites were identified within 10 km of the Proposed Development Area, with none identified for geese and gulls within 25 km of the Proposed Development Area.
- 7.6.5. One LNR was located within 5 km of the Proposed Development Area: SWT Reserve, Dalmellington Moss^{54,55}. Dalmellington Moss SWT Reserve, approximately 1.2 km to the west of the Proposed Development Area supports breeding waders including curlew and snipe, and short-eared owl.

Four LNCSS⁵⁵ with ornithological interests were identified within 5 km of the Proposed Development Area:
 - Connel Burn/Benty Cowan Provisional Wildlife Site (pWS; 0 km east);
 - Craigengillan/Ness Glen Wood pWS (0.9 km west);
 - Dalgig Plantation pWS (3.1 km northeast); and
 - Riggfoot/Lanemark Bogside Wetland pWS (3.8 km northeast).
- 7.6.6. One IBA was also identified within 5 km of the Proposed Development Area: Galloway Forest Park⁵⁶, approximately 4.3 km southwest at the closest point. The designated ornithological features of Galloway Forest Park IBA are black grouse, short-eared owl and peregrine.
- 7.6.7. All statutory and non-statutory designated sites listed above are shown on Figure 7.3: Statutory and Non-statutory Designated Sites with Ornithological Features, Volume 2a of the EIAR.

Ornithological Features

The data search provided records of the following target species:

- Dark-bellied brent goose;
- Pale-bellied brent goose;
- Barnacle goose;
- Greylag goose;
- Taiga bean goose;
- Pink-footed goose;
- Tundra bean goose;
- Greenland white-fronted goose;
- European white-fronted goose;
- Lesser white-fronted goose;
- Teal;
- Black grouse;

⁵² British Ornithologists' Union (2022). *The British List: A Checklist of Birds of Britain (10th edition)*. Ibis 164: 860–910.

⁵³ Bogton Loch SSSI. Available from - <https://sitelink.nature.scot/site/240> [Accessed: 12/12/2023]

⁵⁴ Dalmellington Moss SWT Reserve. Available from - <https://scottishwildlifetrust.org.uk/reserve/dalmellington-moss/> [Accessed: 27/03/2024]

⁵⁵ East Ayrshire Council (2016). *State of the Environment Report: Chapter 3: Ecology and Nature Conservation*. Available from - <https://www.east-ayrshire.gov.uk/Resources/PDF/P/Planning-SoE-Chapter-3-Ecology-&-Nature-Conservation.pdf> [Accessed: 27/03/2024]

⁵⁶ BirdLife International (2024). *Important Bird Area factsheet: Galloway Forest Park*. Available from - <https://datazone.birdlife.org/site/factsheet/galloway-forest-park-iba-united-kingdom> [Accessed: on 27/03/2024]

- Curlew;
- Snipe;
- Golden eagle; and
- White-tailed eagle.

7.6.8. A full list of species is provided in Table 7.1.4, Technical Appendix 7.1: Ornithology (with the exception of confidential records which are provided in Confidential Technical Appendix 7.2: Ornithology, Volume 3 of the EIAR.

Baseline Surveys

Vantage Point Surveys: Breeding Season

7.6.9. The breeding season surveys undertaken between April and August 2021 and March and August 2022 recorded flight lines from a total of eight target species, all of which were geese, wader, large gull and raptor species. Table 7.8 summarises levels of flight activity for each species and the amount of that flight activity which was in the CRZ at PCH (i.e. potential for collisions). One species (lesser black-backed gull, shown in bold) was recorded frequently and met the criteria for CRM. The associated flight lines are shown in Figure 7.4: Breeding Season VP Survey Results 2021 and Figure 7.5: Breeding Season VP Survey Results 2022, Volume 2a of the EIAR.

Table 7.8: Results of the breeding season flight activity surveys in 2021 and 2022

Species	No. of flights (individuals) – 2021*	No. of flights (individuals) in the CRZ at PCH – 2021	No. of flights (individuals) – 2022**	No. of flights (individuals) in the CRZ at PCH - 2022
Greylag goose	-	-	1 (2)	1 (2)
Snipe	6 (7)	-	-	-
Herring gull	-	-	3 (18)	-
Lesser black-backed gull	18 (37)	6 (9)	15 (18)	-
Goshawk	1 (1)	-	2 (2)	-
Hen harrier	1 (1)	-	1 (1)	1 (1)
Red kite	-	-	1 (1)	-
Peregrine	-	-	1 (1)	-

Source: *MBEC; **Natural Power

Vantage Point Surveys: Non-breeding Season

7.6.10. A total of nine target species were recorded during non-breeding season VP surveys between September 2021 and February 2022 (inclusive), and September 2022 and February 2023 (inclusive). Four of those species were also recorded during the breeding season, with the addition of barnacle goose, pink-footed goose, whooper swan, golden plover and woodcock. Table 7. summarises levels of flight activity for each species and the amount of that flight activity recorded in the CRZ at PCH. Those ornithological features for which CRM was undertaken are shown in bold text. Golden plover, snipe and hen harrier were the most frequently recorded species. The flight lines for

the non-breeding season target species are shown in Figure 7.6: Non-breeding Season VP Survey Results 2021-2022 and Figure 7.7: Non-breeding Season VP Survey Results 2022-2023, Volume 2a of the EIAR.

Table 7.9: Results of the non-breeding season flight activity surveys in 2021-2022 and 2022-2023

Species	No. of flights (individuals) – 2021-2022	No. of flights (individuals) in the CRZ at PCH – 2021-2022	No. of flights (individuals) – 2022-2023	No. of flights (individuals) in the CRZ at PCH – 2022-2023
Barnacle goose	2 (250)	2 (250)	-	-
Pink-footed goose	-	-	2 (125)	-
Whooper swan	1 (22)	-	1 (5)	1 (5)
Golden plover	4 (61)	-	-	-
Woodcock	-	-	1 (1)	-
Snipe	-	-	3 (3)	-
Goshawk	1 (1)	1 (1)	1 (1)	1 (1)
Hen harrier	3 (3)	-	-	-
Peregrine	2 (2)	-	-	-

Source: Natural Power

7.6.11. Records of secondary species and incidental records of target species recorded during the breeding and non-breeding season VP surveys are summarised in Technical Appendix 7.1: Ornithology, Volume 3 of the EIAR.

Moorland Breeding Bird Surveys

7.6.12. A single target species, snipe, was considered to have bred within the Survey Area during the MBBS in 2021 (one territory) and 2022 (five territories). A flock of nine golden plover and a single common sandpiper were also recorded during the MBBS in 2021 and 2022, respectively. However, these species were not considered to have bred within the Survey Area. As the flock of golden plover was recorded in April 2021³⁷, it is considered likely that this flock was on passage.

7.6.13. Crossbill were recorded in flight just beyond the north boundary of the Proposed Development Area during the MBBS in April and May 2022, however no breeding behaviour was observed.

7.6.14. Breeding territories are shown in Figure 7.8: Moorland Breeding Bird Survey Results 2021 and 2022, Volume 3 of the EIAR.

Breeding Raptor Surveys

7.6.15. Two target species were recorded during the Breeding Raptor Surveys in 2022, namely red kite and barn owl. There was no evidence that red kite bred within the Survey Area (Figure 7.2: Ornithology Survey Areas). However, barn owl bred within the Survey Area, further details of which are provided within Confidential Technical Appendix 7.2: Ornithology. There was no evidence that target raptor species bred within the Survey Area in 2021.

7.6.16. Additionally, although there is suitable breeding habitat for peregrine within the Survey Area, no peregrines were recorded during the Breeding Raptor Surveys in 2021 or 2022. Details of historic breeding activity at known nest sites within the Survey Area are provided within Confidential Technical Appendix 7.2: Ornithology.

Black Grouse Surveys

7.6.17. No black grouse were recorded during targeted surveys undertaken in 2021 or 2022.

Collision Risk Modelling

- 7.6.18. Two target species met the criteria for CRM, one during the breeding season (lesser black-backed gull) and one (barnacle goose) during the non-breeding season. Both lesser black-backed gull and barnacle goose were considered to have 'directional' flights (See Section 7.4).
- 7.6.19. The risk of collision for both species, calculated with avoidance factors of 95%, 98%, 99%, 99.5% and 99.8% are presented in Table 7.. The results in bold and grey cells indicate the NatureScot recommended avoidance rate (SNH, 2018)²² for each species. Full results which the avoidance rates have been calculated on are provided in Technical Appendix 7.1, Volume 3 of the EIAR.

Table 7.10: Estimated number of collisions during the breeding season (March to August) and non-breeding season (September to February)

Species	Model type	Season	Estimated mortality assuming avoidance of*:				
			95%	98%	99%	99.5%	99.8%
Barnacle goose	Commuting	Breeding	0	0	0	0	0
		Non-breeding	0.0231	0.0092	0.0046	0.0023	0.0009
		Annual	0.0231	0.0092	0.0046	0.0023	0.0009
Lesser black-backed gull	Commuting	Breeding	0.0009	0.0004	0.0002	0.0001	<0.0001
		Non-breeding	0	0	0	0	0
		Annual	0.0009	0.0004	0.0002	0.0001	<0.0001

*Numbers in bold and grey cells represent NatureScot recommended avoidance rates. Annual estimates are the sum of the breeding and non-breeding estimates for species with at-risk flight activity across more than one season. Confidence intervals of the above estimates are provided in Tables 7.1.22 and 7.1.23 in Technical Appendix 7.1, Volume 3 of the EIAR.

7.7. Assessment of Potential Effects

General Impacts

- 7.7.1. The main ways in which a wind farm may affect ornithological receptors are via:
- Habitat loss due to land-take: construction of turbine bases, access tracks and other structures will lead to direct habitat loss. The effects of habitat loss will depend upon the extent of land-take and the type of habitat affected. Embedded mitigation measures will be put in place to prevent any associated damage to, or destruction of, nests, as discussed below.
 - Disturbance and/or displacement: The construction and decommissioning stages of wind farm developments can have potential impacts caused by associated noise and visual disturbance and if unmitigated could lead to the temporary displacement or disruption of breeding and foraging birds whilst the construction/decommissioning activities are taking place. The level of impact depends on the timing of potentially disturbing activities, the extent of displacement (both spatially and temporally), and the availability

of suitable habitats in the surrounding area for displaced birds to occupy. Disturbance impacts during the operational phase are likely to be less than during the construction/decommissioning phases, as disturbance due to human activities will be considerably reduced, plus some species may become habituated to the activity. Displacement around turbines following construction and lasting throughout the operational phase may result for some ornithological features. The extent of this depends on the sensitivity of the species, the season (breeding or non-breeding) as well as site-specific factors. In addition, during the operational phase turbines may act as a barrier to movement, where regularly having to fly around the wind farm could result in greater energy expenditure.

- Collision with turbines: collision of a bird with the turbine rotors or tower is likely to be fatal. The likelihood of collision depends on a number of factors, such as the ecology of the species (time spent flying, manoeuvrability, etc), the surrounding habitat, the layout of the turbines and weather conditions. Note that birds which avoid a wind farm due to disturbance, will clearly not also be subject to collision risk.

7.7.2. In line with the principles of proportionate EIA, embedded mitigation is considered from the outset. Features have only been taken on for further impact assessment if it cannot be concluded that there will be no likely significant effect following the implementation of this embedded mitigation.

Embedded Mitigation

7.7.3. Embedded mitigation measures are proposed at the outset of the Proposed Development, to reduce impacts associated with construction, operation and decommissioning, and are outlined as follows.

Construction Phase: General

- 7.7.4. All relevant construction phase embedded mitigation measures, such as appointment of an ECoW, will be implemented through a CEMP, which will be agreed in advance with the local planning authorities, in consultation with NatureScot.
- 7.7.5. In line with good practice, an independent ECoW will be appointed prior to the commencement of construction and will be present during enabling works and throughout the construction period. They will be a suitably experienced individual, whose role will be to oversee that all works are carried out in accordance with environmental legislation and good practice, and with agreed construction phase management plans, such as the CEMP.
- 7.7.6. Prior to the start of construction, contractors will be made aware of the ornithological sensitivities within the area of the Proposed Development (particularly with regard to the potential presence of Schedule 1⁷ breeding species). The ECoW will give regular Toolbox Talks to contractors regarding the status and locations of protected and sensitive species and habitats at the Proposed Development.
- 7.7.7. The ECoW will carry out pre-construction survey checks during the main bird breeding season (March to August, inclusive)⁵⁷ in advance of vegetation stripping or excavation works to check for the presence of any active nests. Any active nests found will be cordoned off to a suitable distance for the species concerned (in line with appropriate guidance²³) and construction operations delayed within the cordon until the young have fledged and/or the nest becomes vacant naturally. There will be a clear line of responsibility for establishing that these measures are adhered to. This will reduce the possibility of illegal damage, destruction or disturbance to occupied bird nests during the construction phase. Full details of the ECoW's role and responsibilities will be provided in the CEMP and secured through an appropriate planning condition.

⁵⁷ NatureScot (2021). Bird breeding season dates in Scotland. Available from - <https://www.nature.scot/doc/bird-breeding-season-dates-scotland> (Accessed 26/04/2024)

- 7.7.8. Good practice via timing of works and pre-construction surveys will be necessary to reduce the possibility of illegal damage, destruction or disturbance to occupied bird nests during the construction phase. Adherence to this will be overseen by the ECoW.
- 7.7.9. A SPP will be produced; this plan will detail embedded mitigation measures required prior to and during construction for protected bird species potentially breeding at the Proposed Development, particularly in the vicinity of historic nests or suitable nesting habitat.

Operational Phase: General

- 7.7.10. With the exception of the operation and general maintenance of the wind turbines, there will be little on-site activity during the operational phase, and therefore levels of disturbance will be considerably reduced relative to the construction period.
- 7.7.11. Where potential effects exist, control measures will be incorporated into an Operational Environmental Management Plan (OEMP). The OEMP will detail mitigation measures required during the operational phase relating to bird species to ensure ongoing compliance with relevant environmental legislation.

Operational Phase: Aviation lighting

- 7.7.12. As outlined in Chapter 13. Aviation and Other Effects and Figure 5.4a Aviation Lighting Strategy, it is proposed that 5 turbines will be fitted with aviation lighting, and the final lighting scheme has been agreed by the Civil Aviation Authority (CAA) as follows:
- Medium intensity steady-red (2,000 candela) are to be fitted on the nacelles of turbines T01, T04, T05, T09 and T10;
 - A second 2,000 candela light on the nacelles of the above turbines to act as alternate in the event of a failure of the main light (both lights should not be lit at the same time);
 - Lights are capable of being dimmed to 10% of peak intensity when the lowest visibility (as measured at suitable points around the wind farm by visibility measuring devices) exceeds 5 km; and
 - A scheme of infra-red lighting to be agreed with the MOD to account for operators who carry night vision device capability (dimming permission is applicable only to visible lights, not infra-red lighting).
- 7.7.13. Research assessing how light impacts bird behaviour has found that lighting can have a role in attracting or disorientating night time migrant birds⁵⁸. Therefore, should lighting be positioned on a wind turbine, there would potentially be an increased risk of collision. Some studies have been undertaken to quantify the effects of lighting, although the majority have been conducted at communication towers rather than turbines, and very few have been undertaken in the UK and/or Europe. Communication towers are typically taller than turbines, and are supported with guy wires making comparisons potentially difficult.
- 7.7.14. Several studies have reported pronounced bird aggregations associated with aviation lighting^{59,60}. The colour of light and whether it is steady burning or flashing makes a significant difference in bird aggregation behaviour.

Generally, steady burning lights have been found to attract night time migrants whereas flashing lights do not have the same effect⁵⁸.

- 7.7.15. Research by Kerlinger et al.⁶¹ assessed collision fatality data from 30 wind farms with lighting in North America and demonstrated that fatality rates of night migrating birds are relatively low (between 1-7 individuals per turbine per year). Their results indicate that large scale fatality rates at wind farms with lighting are highly unlikely to occur and fatalities in general recorded at wind farms are much lower than that reported for communications towers. Communication towers, due to their greater height than turbines, extend into altitudes where most night time migrants fly, in addition to being constructed with guy wires.
- 7.7.16. It is acknowledged that most of the literature is based on US studies where migrant species are different from the UK. There is limited work published from European studies, although Huppopp et al.⁶², conducted a study on an offshore wind farm in the North Sea whereby the objective was to determine the effects of wind farms on migrants. It was noted using radar and thermal imagery during the year-long study that terrestrial birds in particular are attracted to illuminated offshore structures at night thereby becoming at greater risk of collision.
- 7.7.17. However, it must be noted that comparisons between offshore and onshore wind farms has only limited application, as birds typically fly at lower altitudes over sea than over land⁶³, therefore being more likely to collide with the turbine. In addition, offshore structures offer a place to rest for migrants, whereas there are numerous areas to rest up in terrestrial habitats.
- 7.7.18. A baseline assessment on the number of night time passage migrants has not been undertaken for the Proposed Development, however there was no evidence of large passerine flocks, and only a small number of wildfowl flights during VP watches, suggesting that passage migrant numbers are relatively small. Furthermore, most night time migrants are likely to be higher flying than the maximum tip height^{64,65} and the red lighting is unlikely to cause a significant attraction⁶⁶. As such, a significant increase in the predicted collision risks associated with the proposed development due to aviation lighting is considered to be highly unlikely.

Decommissioning

- 7.7.19. Embedded mitigation of decommissioning activities will follow that proposed for the embedded mitigation of construction activities, including pre-decommissioning surveys and ECoW supervision of activities.

Feature Assessment

- 7.7.20. On the basis of the description of the ornithological baseline, together with the legislation and guidance, a summary of the ornithological features within and surrounding the Proposed Development Area and identified impacts, is provided in Table 7.11 below. Impacts of habitat loss and disturbance and/or displacement have not been considered for species for which there is minimal or no suitable foraging or breeding habitat present within the Proposed Development Area.

⁵⁸ Gehring, J. Kerlinger, P. & Manville, M. 2009. Communication Towers, Lights, and birds: successful methods of reducing the frequency of avian collisions. *Ecological Applications* 19, (2): 505-515

⁵⁹ Avery, M. L., Springer, P. F. and Cassel, J. F. 1976. The effects of a tall tower on nocturnal bird migration—a portable ceilometer study. *Auk* 93: 281-291

⁶⁰ Cochran, W. W., and Graber R.R. 1958. Attraction of nocturnal migrants by lights on a television tower. *Wilson Bulletin* 70: 378- 380

⁶¹ Kerlinger, P. Joelle, L. Gehring, J. Erickson, W.P. Curry, R. Jain, A and Guarnaccia, J. 2010. Night Migrant fatalities and Obstruction Lighting at Wind Turbines in North America. *The Wilson Journal of Ornithology*. 122(4): 744-754

⁶² Huppopp, O., Dierschke, J., Exo, K.-M., Friedrich, E. and Hill, R. (2006), Bird migration studies and potential collision risk with offshore wind turbines. *Ibis*, 148: 90–109

⁶³ Krüger, T. & Garthe, S. 2001. Flight altitudes of coastal birds in relation to wind direction and speed. *Atlantic Seabirds* 3: 203–216

⁶⁴ Kerlinger, P. and Moore, F.R. 1989. Atmospheric structure and avian migration. *Current Ornithology*. 6: 109-142

⁶⁵ Krüger, T. & Garthe, S. 2001. Flight altitudes of coastal birds in relation to wind direction and speed. *Atlantic Seabirds* 3: 203–216

⁶⁶ Evans W. R, Akashi Y, Altman N. S, Manville A. M., II 2007. Response of night-migrating songbirds in cloud to colored and flashing light. *North American Birds*. 60, 476–488

- 7.7.21. Where no significant effects are likely with the application of embedded mitigation as outlined above this is specified, the feature is not considered an IOF requiring EIA. Further details of evaluation of each ornithological feature and identified impacts to determine IOFs is provided in Table 7.12.
- 7.7.22. As no specific ornithological interests are listed for Connel Burn/Benty Cowan, Craigengillan/Ness Glen, Dalgig Plantation, and Riggfoot/Lanemark Bogside Wetland pWSs⁵⁵, these LNCSs have been scoped out of the assessment.

Table 7.11: Features and impacts identified for inclusion in the assessment

Features	Impact
Bogton Loch SSSI	Adverse effects on ornithological features of interest
Dalmellington Moss SWT Reserve	Adverse effects on ornithological features of interest
Galloway Forest Park IBA	Adverse effects on ornithological features of interest
Barnacle goose	Collision only
Greylag goose	Collision only
Pink-footed goose	Collision only
Whooper swan	Collision only
Black grouse	Disturbance and/or displacement only
Golden plover	Collision and disturbance and/or displacement
Woodcock	Collision only
Snipe	Habitat loss, disturbance and/or displacement and collision
Herring gull	Collision only
Lesser black-backed gull	Collision only
Goshawk	Habitat loss, disturbance and/or displacement and collision
Hen harrier	Collision only
Red kite	Collision only
Barn owl	Disturbance/displacement only
Peregrine	Collision only

Table 7.12: Determination of Important Ornithological Features occurring within the Proposed Development Area

Feature	Covering legislation and guidance/conservation designation ^{3,7,32}	Geographical level of value	Population estimate ^{26,45,67}	Scottish context ⁶⁷	Baseline	IOF	Justification
Bogton Loch	SSSI	National	-	-	-	No	Bogton Loch SSSI lies approximately 1.3 km west of the Proposed Development Area. The breeding bird assemblage is a qualifying feature of the Bogton Loch SSSI, which includes black-headed gull, willow tit, grasshopper warbler, song thrush, spotted flycatcher and reed bunting. No species listed within the breeding bird assemblage were recorded during baseline surveys of the Proposed Development Area. Therefore, Bogton Loch SSSI is not considered to be an IOF and has not been taken forward for further assessment.
Dalmellington Moss SWT Reserve	LNR	Local	-	-	-	No	Dalmellington Moss LNR lies approximately 1.2 km to the west of the Proposed Development Area. The LNR supports breeding waders such as curlew and snipe, and short-eared owl. Curlew and short-eared owl were not recorded during baseline surveys of the Proposed Development. Snipe were considered to have bred within the MBBS Area, with one territory identified in 2021 and five identified in 2022. However, as none of the identified territories were within 500 m of the Proposed Development, any effects of habitat loss or disturbance/displacement on snipe would be negligible. It is therefore considered that any adverse effects on features of ornithological interest would be negligible. Dalmellington Moss LNR is not considered to be an IOF and has not been taken forward for further assessment.
Galloway Forest Park	IBA	Local	-	-	-	No	Galloway Forest Park IBA lies approximately 4.3 km southwest of the Proposed Development Area. The designated ornithological features of Galloway Forest Park include black grouse, short-eared owl and peregrine. No black grouse or short-eared owl were recorded during baseline surveys of the Proposed Development Area, and the collision risk of the Proposed Development to peregrine is considered to be of negligible magnitude and not significant. It is therefore considered that any adverse effects on features of ornithological interest would be negligible. Therefore Galloway Forest Park is not considered to be an IOF and has not been taken forward for further assessment.
Barnacle goose	Annex I, Amber, SBL	Local	UK: 1,550 breeding pairs; 105,000 wintering individuals Scotland: 70,000 wintering individuals NHZ 19: 47,000 wintering individuals	Barnacle goose is a common wintering species in Scotland, which supports 20% of the world's wintering population. Wintering birds from Greenland are widespread across the	Two flights of approximately 250 birds in total were recorded at PCH in the CRZ during the 2021-2022 non-breeding season VPs. As the single flight was by >10 birds, barnacle	No	Barnacle goose is an Annex I, UK BoCC Amber and SBL-listed species of international importance for the wintering population in the UK. A predicted annual collision mortality of 0.0009 birds represents 0.000002% of the NHZ wintering population, 0.000001% of the wintering population in Scotland and 0.0000009% of the wintering population in the UK. Migrating barnacle geese may be at risk of collision with turbines, however the collision risk is considered to be of negligible magnitude and not significant . Therefore, barnacle goose is not considered to be an IOF.

⁶⁷ Forrester, R.W., Andrews, I.J., McInerney, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy D.S. (eds). (2007). *The Birds of Scotland*. The Scottish Ornithologists' Club, Aberlady.

Feature	Covering legislation and guidance/conservation designation ^{3,7,32}	Geographical level of value	Population estimate ^{26,45,67}	Scottish context ⁴⁶⁷	Baseline	IOF	Justification
Greylag goose	Amber	Negligible	UK: 47,000 breeding pairs; 230,000 wintering individuals Scotland: 20,000 breeding individuals; 85,000 wintering individuals No NHZ estimate	<p>west coast of Scotland, particularly the Outer and Inner Hebrides, with birds from Svalbard wintering largely along the Solway Firth.</p> <p>This is a common resident species breeding and wintering in Scotland, with a further wintering population arriving from Iceland (Scotland supports 95% of the Icelandic greylag goose population in winter).</p> <p>The breeding population in the south of Scotland is considered to be naturalised and feral and not of conservation importance. The non-breeding population which winters in the south of Scotland, however, largely comprises birds that breed in Iceland, and is of conservation importance.</p>	<p>goose qualified for CRM.</p> <p>Annual (non-breeding season only) predicted collision mortality is 0.32 birds.</p> <p>A single flight of two birds was recorded at PCH in the CRZ during the breeding season VP surveys in 2022.</p> <p>As the single flight was by <10 birds, the flight did not qualify for CRM.</p>	No	<p>Greylag goose is a UK BoCC Amber-listed species for the wintering population in the UK.</p> <p>As only a single flight was recorded across all VP surveys at PCH, it is considered that collision risk for this species is of negligible magnitude and not significant.</p> <p>Therefore, greylag goose is not considered to be an IOF.</p>
Pink-footed goose	Amber	Negligible	UK: 510,000 wintering individuals Scotland: 100,000-150,000 wintering individuals, 200,000 migrating individuals in October NHZ 19: 34,621 wintering individuals	<p>Pink-footed goose from Iceland and Greenland are a common wintering species across the east and south of Scotland, with 50% of the world's wintering population supported in winter, and approximately 66% of the world's migrating population in Autumn.</p>	<p>Two flights of approximately 125 birds in total were recorded during the 2022-2023 non-breeding season VP surveys.</p> <p>As these flights were not recorded at PCH in the CRZ, pink-footed goose did not qualify for CRM.</p>	No	<p>Pink-footed goose is a UK BoCC Amber-listed species of international importance for the wintering population in the UK.</p> <p>As the flights recorded were not at PCH, it is considered that collision risk for this species is of negligible magnitude and not significant.</p> <p>Therefore, pink-footed goose is not considered to be an IOF.</p>

Feature	Covering legislation and guidance/conservation designation ^{3,7,32}	Geographical level of value	Population estimate ^{26,45,67}	Scottish context ⁴⁶⁷	Baseline	IOF	Justification
Whooper swan	Schedule 1, Annex I, Amber, SBL	Local	UK: 28 breeding pairs; 19,500 wintering individuals Scotland: 3-7 breeding pairs; 4,142 wintering individuals NHZ 19: 1,188 wintering individuals	Whooper swan is a rare breeding bird in Scotland, where a small number of wild pairs typically breed in the north of Scotland, the Hebrides and Shetland. They are more common in Scotland during winter, with 16% of the Icelandic population supported.	A single flight of 22 birds was recorded during the 2021-2022 non-breeding season VP surveys, with a single flight of five birds recorded during the 2022-2023 non-breeding season VP surveys. Only the flight recorded during the 2022-2023 non-breeding season VP surveys was recorded at PCH in the CRZ, however, as it was by <10 birds it therefore did not qualify for CRM.	No	Whooper swan is a Schedule 1, Annex I, UK BoCC Amber, and SBL-listed species of international importance for the wintering population in the UK. As only a single flight of <10 birds was recorded at PCH in the CRZ, it is considered that collision risk for this species is of negligible magnitude and not significant . Therefore, whooper swan is not considered to be an IOF.
Black grouse	Red, SBL	Local	UK: 4850 lekking males Scotland: 3550-5750 lekking males; 7500-19,000 wintering individuals NHZ 19: 121 lekking males	Black grouse is a widespread resident species within Scotland, which holds approximately 71% of the population in the UK. The highest concentrations of black grouse are within Perth and Kinross, North-east Scotland and Badenoch and Strathspey. This species is more sparsely distributed across Argyll, Ayrshire, Dumfries and Galloway and the Borders.	No black grouse were recorded during the black grouse surveys completed in 2021 and 2022. Historic records of black grouse returned during the data search indicated that lekking black grouse within 5 km of the Proposed Development Area were last recorded in 2016. Details of historic black grouse records are provided in Confidential Technical Appendix 7.2: Ornithology.	No	Black grouse is a UK BoCC Red List and SBL-listed species of conservation concern due to decline in breeding population in the UK. No black grouse were recorded during any of the baseline ornithology surveys of the Proposed Development Area and surrounding 1.5 km buffer in 2021 or 2022. Black grouse have historically been present within the wider area surrounding the Proposed Development as indicated by records returned during the data search and review of baseline ornithology surveys carried out for surrounding developments (see Section 7.6). The Proposed Development is located within commercial plantation forestry which would provide limited suitable breeding habitat where there are stands of re-stocked and pre-thicket stage young plantation. As there is suitable breeding habitat for black grouse within the Proposed Development Area, there is the potential for impact of disturbance/and or displacement of black grouse should the recovering population return to breed in this area. However, given that there is ample suitable breeding habitat in the wider area, it is expected that any impacts of disturbance and/or displacement would be associated mainly with construction and decommissioning, which would be mitigated with the implementation of embedded mitigation, outlined above in this section (Section 7.7). Any

Feature	Covering legislation and guidance/conservation designation ^{3,7,32}	Geographical level of value	Population estimate ^{26,45,67}	Scottish context ⁴⁶⁷	Baseline	IOF	Justification
Golden plover	Annex I, SBL	Negligible	UK: 32,500-50,500 breeding pairs; 410,000 wintering individuals Scotland: 15,000 breeding pairs; 25,000-35,000 wintering individuals; 10,000-30,000 spring passage individuals; 20,000-60,000 autumn passage individuals NHZ 19: 778 breeding pairs	Golden plover is a widespread breeding bird in upland habitat in Scotland, supporting 80% of the breeding population in the UK. During winter, golden plover occupy coastal areas around Scotland, joined by other wintering golden plover from Fennoscandia and Greenland.	A single flock of nine birds was recorded during the MBBS within the Survey Area in April 2021, considered to be on passage. No breeding territories were identified in 2021 or 2022. Four flights of 61 birds in total were recorded during the 2021-2022 non-breeding season VP surveys. As these flights were not recorded at PCH in the CRZ, golden plover did not qualify for CRM.	No	<p>potential impact of disturbance/displacement on black grouse is therefore considered to be of negligible impact and not significant.</p> <p>As such black grouse is not considered to be an IOF.</p> <p>Golden plover is an Annex I, SBL-listed species of conservation concern.</p> <p>The flock of nine birds considered to be on passage in April 2021 was recorded to the east of the Proposed Development Area in suitable foraging habitat on Barbeys Hill, approximately 1.5 km east of infrastructure associated with the Proposed Development. Given that there is minimal suitable foraging habitat within the Proposed Development Area for golden plover on passage, it is considered that any displacement and/or disturbance to the passage population is of negligible magnitude and not significant.</p> <p>As the flights recorded were not at PCH, it is considered that collision risk for this species is of negligible magnitude and not significant.</p> <p>Therefore, golden plover is not considered to be an IOF.</p>
Woodcock	Red, SBL	Negligible	UK: 43,000-71,000 breeding pairs; 1,400,000 wintering individuals Scotland: 24,000-56,500 roding males; 78,000-167,000 wintering individuals No NHZ estimate	Woodcock is a widespread resident bird in Scotland, which supports 50% of the UK population. Woodcock primarily breed in dense vegetation such as bracken and heather, and in rides and clearings in deciduous or mixed woodland. During winter, woodcock also occupy conifer woodland and scrub habitat. In winter, resident birds are joined by other	A single flight of a single bird was recorded during the 2021-2022 non-breeding season VP surveys. As this flight was not at PCH in the CRZ, woodcock did not qualify for CRM.	No	<p>Woodcock is included on the UK BoCC Red List as a species of conservation concern due to decline in breeding range in the UK.</p> <p>The only record of woodcock was recorded in January 2023 and given that the single flight recorded was not at PCH in the CRZ, it is considered that collision risk for this species is of negligible magnitude and not significant.</p> <p>Therefore, woodcock is not considered to be an IOF.</p>

Feature	Covering legislation and guidance/conservation designation ^{3,7,32}	Geographical level of value	Population estimate ^{26,45,67}	Scottish context ⁴⁶⁷	Baseline	IOF	Justification
Snipe	Amber	Local	UK: 66,500 breeding pairs; 1,100,000 wintering individuals Scotland: 34,000-40,000 breeding pairs; 10,000-30,000 wintering individuals NHZ 19: 1,252 breeding pairs	wintering woodcock from Fennoscandia. Breeding snipe are widespread within Scotland, with 65% of the UK breeding population present in marshy grassland and wet bog habitat across lowland and upland areas. Although there has been an overall 17% increase in breeding snipe in Scotland within the past 26 years, a 10% decline was reported between 2021 and 2022 ⁶⁸ .	A single breeding territory was identified during the MBBS within the Survey Area in 2021, with five identified in 2022. One of the identified territories was located within 500 m of the Proposed Development and associated infrastructure. Six flights of seven birds in total was recorded during the 2021 breeding season VP surveys, with three flights of three birds in total recorded during the 2021-2022 non-breeding season VP surveys. As none of the flights were recorded at PCH in the CRZ, snipe did not qualify for CRM.	No	Snipe is a UK BoCC Amber-listed species of conservation concern due to decline in breeding range and wintering population. As there is little suitable breeding habitat for snipe within the Proposed Development Area, and loss of suitable habitat is expected to be minimal (see Table 6.7 in Chapter 6: Ecology, Volume 1 of the EIAR), it is considered that any impact of habitat loss could be of negligible magnitude and not significant . The breeding territories identified in 2021 and 2022 were located within 500 m of the Proposed Development Area. Of these, one was located within 500 m of the infrastructure associated with the Proposed Development. A single breeding territory represents 0.08% of the NHZ 19 breeding population and 0.008% of the breeding population in Scotland. As there is ample available breeding habitat within the wider area surrounding the Proposed Development, it is considered that any impact of disturbance and/or displacement would be of negligible magnitude and not significant . As the flights recorded were not at PCH, it is considered that collision risk for this species is of negligible magnitude and not significant . Therefore, snipe is not considered to be an IOF.
Herring gull	Red, SBL	Negligible	UK: 130,000 breeding pairs; 710,000-780,000 wintering individuals Scotland: 72,100 apparently occupied nests; 91,000 wintering individuals NHZ 19: 1,130 breeding pairs	Herring gull is a common and widespread breeding species in Scotland, which supports 49% of the UK breeding population. Large breeding populations are located in the northeast, the Firth of Forth and the Firth of Clyde.	Three flights of 18 birds in total were recorded during the 2022 breeding season VP surveys. As none of the flights were recorded at PCH in the CRZ, herring gull did not qualify for CRM.	No	Herring gull is a UK BoCC Red and SBL-listed species of conservation concern of international importance for the breeding and wintering population in the UK and decline in those populations. As the flights recorded were not at PCH, it is considered that collision risk for this species is of negligible magnitude and not significant . Therefore, herring gull is not considered to be an IOF.

⁶⁸ Heywood, J.J.N., Massimino, D., Balmer, D.E., Kelly, L., Noble, D.G., Pearce-Higgins, J.W., Woodcock, P., Wotton, S., Gillings, S. & Harris, S.J. (2023). *The Breeding Bird Survey 2022. BTO Research Report 756*. British Trust for Ornithology, Thetford.

Feature	Covering legislation and guidance/conservation designation ^{3,7,32}	Geographical level of value	Population estimate ^{26,45,67}	Scottish context ⁴⁶⁷	Baseline	IOF	Justification
Lesser black-backed gull	Amber	Local	UK: 110,000 breeding pairs; 120,000-130,000 wintering individuals Scotland: 25,000 apparently occupied nests; 30,000-50,000 individuals on spring passage; 50,000-80,000 individuals on autumn passage; and 200-600 wintering individuals NHZ 19: 1,048 breeding pairs	<p>Herring gull breed in coastal areas and inland, nesting in a variety of habitats including rocky shorelines and coastal cliffs, grasslands, moorland and on buildings.</p> <p>Lesser black-backed gull is a common and widespread breeding species in Scotland, which supports 22% of the UK breeding population. The largest breeding populations are located in the central belt, in the Firth of Forth and the Firth of Clyde.</p> <p>Lesser black-backed gull breed in coastal areas and inland, nesting in a variety of habitats including sand dunes, saltmarshes, grasslands, moorland and on buildings.</p>	<p>Eighteen flights of 37 birds in total were recorded during the 2021 breeding season VP surveys, with 15 flights of 18 birds in total recorded during the 2022 breeding season VP surveys. Six of these flights (nine birds in total) were recorded at PCH in the CRZ.</p> <p>Therefore, lesser black-backed gull qualified for CRM.</p> <p>Annual (breeding season only) predicted collision mortality is 0.05 birds.</p>	No	<p>Lesser black-backed gull is a UK BoCC Amber-listed species of conservation concern of international importance for the localised breeding population in the UK.</p> <p>A predicted annual collision mortality of 0.0001 birds represents 0.000005% of the NHZ breeding population, 0.0000002% of the breeding population in Scotland and 0.00000005% of the breeding population in the UK.</p> <p>The annual collision mortality of 0.0001 birds also represents 0.0000002% and 0.0000001% of the passage population during spring and autumn, respectively.</p> <p>Lesser black-backed gull may be at risk of collision with turbines, however, the collision risk is considered to be of negligible magnitude and not significant.</p> <p>Therefore, lesser black-backed gull is not considered to be an IOF.</p>
Goshawk	Schedule 1	Local	UK: 620 breeding pairs (minimum – underreporting considered likely) Scotland: 130 breeding pairs; 350-450 wintering individuals NHZ 19: 31 breeding pairs	<p>The Scottish goshawk population was estimated at 130 pairs between 2000 and 2004. The most recent estimated breeding population size in Scotland is 283 pairs in 2021, of which five were located in South Strathclyde and 16 were located in Dumfries and Galloway. In 2022, seven pairs were located in</p>	<p>A single flight by a single bird was recorded during the 2021 breeding season VP surveys, with two flights of two birds in total recorded during the 2022 breeding season VP surveys. A single flight by a single bird was also recorded during the 2021-2022 non-breeding season</p>	Yes	<p>Goshawk is a Schedule 1-listed species of conservation concern.</p> <p>As none of the flights of single birds were recorded at PCH, it is considered that collision risk for this species is of negligible magnitude and not significant.</p> <p>However, given the presence of suitable breeding habitat within the Proposed Development Area and the elusive nature of goshawk, there is potential for impacts of habitat loss and disturbance/and or displacement on goshawk present within and surrounding the Proposed Development Area.</p> <p>Therefore, goshawk is considered to be an IOF and has been taken forward for full EcIA.</p>

Feature	Covering legislation and guidance/conservation designation ^{3,7,32}	Geographical level of value	Population estimate ^{26,45,67}	Scottish context ⁶⁷	Baseline	IOF	Justification
Hen harrier	Schedule 1 & 1A, Annex I, Red, SBL	Local	UK: 545 breeding pairs Scotland: 633 breeding pairs; 1050-1540 wintering individuals NHZ 19: 18 breeding pairs	<p>South Strathclyde, with 22 pairs in Dumfries and Galloway⁶⁹.</p> <p>As goshawk is a secretive species and remains inconspicuous for much of the year, this species is notoriously difficult to monitor and likely under reported, thus any population estimates are probably highly conservative.</p> <p>Hen harrier is a scarce but widespread species in Scotland, which supports 79% of the UK population and 5-9% of the European population. Hen harrier breeds in upland habitats, primarily in heather moorland and winters in grassland and marsh habitats.</p>	<p>VP surveys, and during the 2022-2023 non-breeding season VP surveys.</p> <p>As none of these flights were recorded at PCH, goshawk did not qualify for CRM.</p> <p>A single flight by a single bird was recorded during the 2021 and 2022 breeding season VP surveys, with three flights of three birds in total recorded during the 2021-2022 non-breeding season VP surveys.</p> <p>As only a single flight by a single bird was recorded at PCH in the CRZ, hen harrier did not qualify for CRM.</p>	No	<p>Hen harrier is a Schedule 1 & 1A, Annex I, UK BoCC Red and SBL-listed species of conservation concern for breeding population decline.</p> <p>As less than three flights of single birds were recorded at PCH, it is considered that collision risk for this species of negligible magnitude and not significant.</p> <p>Therefore, hen harrier is not considered to be an IOF.</p>
Red kite	Schedule 1 & 1A, Annex I, SBL	Negligible	UK: 4400 breeding pairs Scotland: 60 breeding pairs; 300-350 wintering individuals NHZ 19: 83 breeding pairs	<p>Red kite is a scarce resident species within Scotland, with a growing population and breeding range following successful re-introductions in Ross & Cromarty, Stirling and Dumfries & Galloway.</p>	<p>Red kite was recorded during the Breeding Raptor Surveys in 2022, however there was no evidence that red kite bred within the Proposed Development Area or surrounding 2 km buffer.</p>	No	<p>Red kite is a Schedule 1 & 1A, Annex I and SBL-listed species of conservation concern.</p> <p>As the flight recorded was not at PCH, it is considered that collision risk for this species is of negligible magnitude and not significant.</p> <p>Therefore, red kite is not considered to be an IOF.</p>

⁶⁹ Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.

Feature	Covering legislation and guidance/conservation designation ^{3,7,32}	Geographical level of value	Population estimate ^{26,45,67}	Scottish context ⁶⁷	Baseline	IOF	Justification
Barn owl	Schedule 1, SBL	Local	UK: 4000-14,000 breeding pairs Scotland: 500-1000 breeding pairs; 1000-2000 wintering individuals No NHZ estimate	Red kite breeds and forms winter roosts in coniferous and broadleaved woodland stands with open foraging habitat including moorland and lowland farmland. Barn owl is a resident species in Scotland, which supports approximately 20% of the UK population. Barn owl primarily breed in buildings, tree cavities and nest boxes (where provided), commonly associated with agriculture where there is suitable foraging habitat.	A single flight of a single bird was recorded during the breeding season VP surveys in 2022. As this flight was not at PCH in the CRZ, red kite did not qualify for CRM. Barn owl were confirmed to have bred at a single territory within the Survey Area in 2022, with a pair and two juveniles recorded there in July 2022. Further details are provided in Confidential Technical Appendix 7.2: Ornithology.	No	Barn owl is a Schedule 1 and SBL-listed species of conservation concern. The breeding territory is located approximately 3.3 km from the Proposed Development and associated infrastructure, at the closest point. Barn owl show high fidelity to breeding territories once established ⁶⁷ , and the maximum estimated disturbance distance for barn owl is 100 m during the breeding season ²³ . Additionally, as there are no suitable locations for barn owl to establish breeding territory within the Proposed Development Area, it is considered that any impact of disturbance and/or displacement for this species is of negligible magnitude and not significant .
Peregrine	Schedule 1, Annex I, SBL	Local	UK: 1750 (1600-1900) breeding pairs Scotland: 600 breeding pairs; 2000-2500 wintering individuals NHZ 19: 34 breeding pairs	Peregrine is a scarce but widespread resident species in Scotland, which supports 42% of the UK population and 6% of the European population. Peregrine breeds in various habitats, nesting on cliffs in uplands, coasts, quarries and even in cities.	Historic nest sites located within the Survey Area were not occupied during 2021 or 2022 (further details are provided in Confidential Technical Appendix 7.2: Ornithology). There was no evidence that peregrine bred within the Proposed Development Area or surrounding 2 km buffer. A single flight by a single bird was recorded during the 2022 breeding season	No	Peregrine is a Schedule 1, Annex I, SBL-listed species of conservation concern. As the flights recorded were not at PCH, it is considered that collision risk for this species of negligible magnitude and not significant . Therefore, peregrine is not considered to be an IOF.

Feature	Covering legislation and guidance/conservation designation ^{3,7,32}	Geographical level of value	Population estimate ^{26,45,67}	Scottish context ⁴⁶⁷	Baseline	IOF	Justification
					VP surveys, with two flights of two birds in total were recorded during the 2021-2022 non-breeding season VP surveys. As these flights were not recorded at PCH in the CRZ, peregrine did not qualify for CRM.		

Source: Natural Power

Impact Assessment

- 7.7.23. One species, goshawk, has been identified as an IOF requiring full EclA following the application of embedded mitigation (see Table 7.12 above in this Section). An impact assessment for goshawk is provided below for construction and operation periods. Decommissioning effects are predicted to be of similar or lower magnitude to the effects of construction.

Goshawk

- 7.7.24. Goshawk is a scarce breeding bird in Scotland following historic population decline as a result of habitat loss and persecution. Although breeding goshawk remain scarce, the population has shown a gradual recovery, with both population increase and range expansion reported in recent years, with the population in Scotland estimated at 813 breeding pairs in 2021⁷⁰. Goshawk is a secretive species which remains inconspicuous for much of the year, present in large coniferous forests where birds are least vulnerable to disturbance. As such, goshawk is notoriously difficult to monitor and likely under reported, thus any population estimates are probably highly conservative.
- 7.7.25. The most recent Scottish Raptor Monitoring Scheme (SRMS) Report⁶⁹ identified that 82 of 123 known home ranges in Scotland were occupied by pairs in 2021, with 98 of 135 occupied in 2022. In the SSRSG region where the Proposed Development is located, five of seven known home ranges were occupied, three of which were monitored in 2021 and confirmed to have fledged young⁷¹. Seven of nine known home ranges were occupied in 2022, of which six were monitored and three confirmed to have fledged young⁷². Of the known home ranges in the DGRSG region which falls within 5 km of the Proposed Development, 16 of 29 home ranges were occupied and monitored in 2021, with young fledged at nine⁷¹. In 2022, 22 of 32 home ranges were occupied, of which 21 were monitored and 15 confirmed to have fledged young⁷².

Baseline Summary

- 7.7.26. Goshawk was recorded during both the 2021 and 2022 breeding season VP surveys, with a single flight by a single bird recorded in 2021 and two flights by single birds in 2022. Goshawk was also recorded during both the 2021-2022 and 2022-2023 non-breeding season VP surveys, with a single flight by a single bird recorded during both years. None of the five flights recorded were at PCH.
- 7.7.27. A review of baseline ornithology surveys completed for surrounding developments indicated that goshawk have also been recorded within the wider area surrounding the Proposed Development. Baseline ornithology surveys for South Kyle Wind Farm recorded nine flights by goshawk at PCH during VP surveys carried out between 2009-2012. CRM was carried out and returned a low collision risk resulting in a negligible impact. During pre-construction surveys carried out for South Kyle Wind Farm, a single goshawk was recorded during 2018 and 2019, however, breeding was not confirmed.
- 7.7.28. Goshawk was also recorded during ornithology surveys undertaken for the South West Scotland Interconnector Project between 2006 and 2008, during which no breeding goshawk were identified and low numbers were recorded in flight during VP surveys. Similarly, goshawk was recorded during the VP surveys undertaken for Windy Standard III Wind Farm between 2009-2010, with low levels of flight activity reported and none recorded at PCH.

⁷⁰ Eaton, M.A. & the Rare Breeding Birds Panel (2023). *Rare Breeding Birds in the United Kingdom in 2021*. British Birds 116: 615-676.

⁷¹ SRMS (2021). Breeding success of raptors in Scotland 2021. Available from - https://raptormonitoring.org/wp-content/uploads/2024/02/All-SRMS-species_2021.pdf [Accessed: 02/05/2024]

⁷² SRMS (2022). Breeding success of raptors in Scotland 2022. Available from - https://raptormonitoring.org/wp-content/uploads/2024/02/All-SRMS-species_2022.pdf [Accessed: 02/05/2024]

- 7.7.29. During construction and operational surveys carried out at Windy Standard II Wind Farm, goshawk were recorded on breeding territory between 2014 and 2019, with no breeding recorded there since. However, a single adult and single immature bird were recorded during 2020. Similarly, a single adult goshawk was recorded during breeding raptor surveys for Windy Standard I Repower in 2020.

Potential Habitat Loss Impacts

- 7.7.30. Coniferous forest, a preferred habitat for goshawk, is present within the majority of the Proposed Development Area. As such, the Proposed Development will cause a permanent loss of 3% of available suitable habitat (including felled coniferous plantation) within the Proposed Development Area (see Table 6.9 in Chapter 6: Ecology and Biodiversity). Placement of wind turbines will be achieved through keyholing which will minimise loss of habitat within the Proposed Development Area for goshawk. Creation of small pockets of clearfell within the Proposed Development Area would create suitable nesting areas which may attract breeding goshawk⁶⁷. However, where suitable nesting habitat is within close vicinity to wind turbines, this is unlikely to be used in preference of suitable habitat in the wider area away from wind turbines⁷³.
- 7.7.31. Due to the nature of commercial plantation forestry in which stands are rotated between mature, felled, re-planted and pre-thicket stages, the available habitat within the Proposed Development Area is subject to frequent change. As such, habitat loss related to the Proposed Development is considered to be minimal in comparison to the regular spatial and temporal changes in suitable habitat due to rotational harvesting already present within the Proposed Development Area. As there is extensive available suitable habitat within the wider area, any effects of habitat loss on goshawk would be of **low negative magnitude** and **not significant**.

Potential Disturbance and Displacement Impacts

- 7.7.32. Goshawk is particularly vulnerable to disturbance in the early part of the breeding season during the nest building and early incubation stages (mid-March to mid-May). Some pairs are prone to deserting nests, particularly if they are first-time breeders or in years when prey availability is low⁷⁴. The type of disturbance most likely to affect goshawk is when a sudden change occurs in the nesting environment, such as commencement of harvesting operations or a sudden increase in traffic volume⁷³. Thus, there is potential for breeding birds to be disturbed, particularly during construction activities. However, goshawk can become habituated to some types of regular disturbance, such as road traffic, if the disturbance is present from the start of nesting⁷⁴. It is considered unlikely that goshawk will be disturbed by turbine operation, although some operational wind farm activities (e.g. track maintenance, cable repairs, etc.) have the potential to disturb breeding goshawk.
- 7.7.33. Given that a goshawk pair was recorded on active territory during baseline ornithology surveys of Windy Standard II⁷⁵ between 2014 and 2019, and an immature bird was recorded to the west of Windy Standard Wind Farm in 2020, undetected breeding goshawk may be present within the wider area surrounding the Proposed Development Area. The plantation surrounding Windy Standard Wind Farm is well connected to plantation within the Proposed Development Area. Goshawk are known to have multiple alternative nest sites up to 300 m apart within a single territory and may move up to 2.5 km to establish a new territory³¹. As such, it is possible that goshawk breeding within the wider area surrounding the Proposed Development, or dispersing immature goshawk, may establish territory within the Proposed Development Area.

⁷³ Garvin, J. C., Jennelle, C. S., Drake, D. and Grodsky, S. M. (2011). *Response of raptors to a windfarm*. Journal of Applied Ecology, 48: 199-209.

⁷⁴ Petty, S.J. (1996). *Reducing disturbance to goshawks during the breeding season*. Forestry Commission Research Information Note 267.

⁷⁵ Natural Power (2001). *Planning Applications for the Proposed Wind Farm Extension at Windy Standard, Dumfries and Galloway*.

- 7.7.34. Breeding goshawk are susceptible to disturbance from a minimum of 300 m up to 500 m²³ from a nest site. As discussed above, goshawk are likely to be most susceptible to disturbance and/or displacement during construction and decommissioning. However, the application of embedded mitigation (outlined above in this Section), such as timing of works to avoid the main breeding bird season (March to August) would minimise disturbance and/or displacement on goshawk. If construction and/or decommissioning were to take place during the main breeding bird season, additional embedded mitigation would be implemented to minimise effects of temporary disturbance and/or displacement (such as pre-construction nest checks and monitoring, implementation of exclusion zones at sufficient distances around active nest sites, and postponement of tree felling within exclusion zones). Exclusion zones would be maintained until all active nest sites are vacated and confirmed as inactive by the ECoW. It is therefore considered that potential effects of temporary disturbance and/or displacement would be of **low negative magnitude and not significant**.
- 7.7.35. It has been suggested that goshawk are more susceptible to disturbance during the construction and/or decommissioning phases⁷³, and may become habituated to low levels of disturbance during operation of a wind farm⁷⁴. Given that studies indicate that raptors avoid wind turbines, any goshawk breeding within the Proposed Development Area may be displaced. However, as there is extensive alternative coniferous forest stands within the area surrounding the Proposed Development, particularly to the south and east, any effects of permanent disturbance and/or displacement during operation is considered to be of **low negative magnitude and not significant**.

Potential Collision Risk Impacts

- 7.7.36. Three flights of three birds in total were recorded during the breeding season VP surveys, with two flights of single birds recorded during the non-breeding season VP surveys. As none of these flights were recorded at PCH, goshawk did not qualify for CRM. Raptors are susceptible to collision with turbines due to their morphology (i.e. heavy wing loading) and foraging behaviour (i.e. focussing on distant prey)⁷⁶. However, goshawk is a species which is at low risk of collision for most of the year due to their foraging behaviour, which comprises flights that are usually at low height above, within or adjacent to woodland cover. It is during the early part of the breeding season that goshawk are more likely to fly at PCH as they perform high aerial displays, usually within close vicinity to a nest⁶⁷.

- 7.7.37. Although goshawk are at most risk of collision during the breeding season, this species is likely to avoid nesting within close vicinity to wind turbines⁷³. As such, any flights that would be at PCH in the CRZ in the absence of the Proposed Development are likely to be non-existent in the presence of the Proposed Development during operation as goshawk are likely avoid nesting within close vicinity to wind turbines.

- 7.7.38. Therefore, it is considered that any impact of collision risk on goshawk is of **negligible magnitude and not significant**.

7.8. Cumulative Effects

- 7.8.1. The following section assesses the predicted cumulative effects on goshawk from the Proposed Development along with all other plans or projects within an appropriate ZoI, following NatureScot guidance³⁰.
- 7.8.2. In line with this guidance, cumulative effects have been considered only for wind developments of more than three turbines within 10 km of the Proposed Development. Projects of three or fewer turbines were excluded due to the lack of publicly available data for developments of this size. Only IOFs for which a greater than negligible residual impact is predicted are considered, as negligible impacts will not result in a detectable increase in cumulative impacts.

Within this search area there are a total of 17 developments that have been included in the CIA. These include:

- Nine operational wind farms;
- Five consented wind farms; and
- Three wind farms at the application stage (submitted).

- 7.8.3. It should be noted that cumulative assessments may be complicated by availability of EclA/EIAR chapters and appraisals for consented developments and, where this information is available, survey periods and methods may differ between developments. Furthermore, some wind farms may have been in existence for many years, and thus contemporary data may not be available. All projects within 10 km are listed in Table 7.13, and data was available for all projects. As such there are no significant limitations to the assessment.

- 7.8.4. No significant cumulative effects were concluded for goshawk. A summary of cumulative impacts is provided in Table 7.13.

⁷⁶ Kikuchi, R. (2008) *Adverse impacts of wind power generation on collision behaviour of birds and anti-predator behaviour of squirrels*. Journal for Nature Conservation 16: 44-55.

Table 7.13: Cumulative Impact Assessment

Site	No. of turbines	Distance to Proposed Development (km)	Site status	Baseline ornithology surveys	Goshawk
Proposed Development	11	0 km	Submitted	2021 - 2023	A total of five flights by single birds were recorded during the VP surveys, of which none were recorded at PCH in the CRZ. There was no evidence of breeding recorded within the survey area.
South Kyle	50	0.5 km	Operational	2009 - 2012	A total of 13 flights were recorded during the VP surveys, of which nine flights by single birds were recorded at PCH in the CRZ. CRM predicted an annual collision mortality of 0.01 birds, representing 0.02% of the NHZ 19 breeding population estimate and 0.004% of the breeding population in Scotland. There was no evidence of breeding recorded within the survey area. Any impact of predicted effects on goshawk were considered to be of low magnitude and not significant.
Enoch Hill	15	1.8 km	Under construction	2011 - 2014	A total of three goshawk flights were recorded during the 2011-2012 non-breeding season VP surveys. A single goshawk was recorded during the 2013 breeding season, however, no evidence of breeding was recorded within the survey area. Any impact of predicted effects on goshawk were considered to be negligible.
North Kyle	49	3.2 km	Under construction	2016 - 2018	A total of 31 flights were recorded, of which 25 were at PCH in the CRZ. CRM predicted an annual collision mortality of 0.11 birds, representing 0.18% of the NHZ 19 population estimate and 0.04% of the breeding population in Scotland. Two breeding territories were identified during the breeding raptor surveys in 2018, with breeding confirmed at one of these territories. The impacts of disturbance and/or displacement and collision risk were predicted to be 'minor' and not significant.
Benbrack Variation	15	3.6 km	Operational	2011 - 2013	Three flights were recorded during the 2011-2012 non-breeding season VP surveys, and a single flight was recorded during the 2012 breeding season VP surveys. Three of these flights were recorded at PCH. CRM predicted an annual collision mortality of 0.20 birds, representing 0.32% of the NHZ 19 population estimate and 0.08% of the breeding population in Scotland. There was no evidence of breeding recorded within the survey area. Predicted impacts were considered to be of negligible magnitude and not significant.
Windy Standard II	30	4.1 km	Operational	2001	Goshawk was not recorded during baseline surveys (including the 1994-2000 period of existing data which was reviewed). As such, no assessment was provided.
Windy Standard III	20	4.4 km	Consented	2009 – 2010, 2012 – 2013	A single flight by a female goshawk was recorded during the 2010 breeding season VP surveys, which was not at PCH. Two flights by a single bird (presumed to be the same bird) were recorded during breeding raptor surveys in 2013, however no evidence of breeding was recorded within the survey area. The impacts of disturbance and/or displacement were considered to be of low magnitude, and collision risk was considered to be of negligible magnitude. All predicted impacts were considered to be not significant.
Over Hill	11	4.6 km	Consented	2013 - 2016	Two flights were recorded during the VP surveys, of which one was at PCH. CRM was not carried out. Goshawk was occasionally recorded during baseline surveys and was heard calling during a survey visit in April 2015, indicating that a territory may have been present within the survey area. However, no further evidence of breeding was recorded. The impacts of disturbance and/or displacement were considered to be of moderate/minor adverse magnitude, and collision risk was considered to be of negligible magnitude. All predicted impacts were considered to be not significant.
Pencloe	19	5.0 km	Under construction	2006 - 2013	Goshawk was not recorded during baseline surveys. As such, no assessment was provided.
Greenburn	16	6.5 km	Consented	2017 - 2018	A single flight by a single bird was recorded during the VP surveys, which was at PCH. CRM was not carried out. A male goshawk was recorded displaying within the survey area in 2018. However, no further evidence of breeding was recorded. The impacts of disturbance and/or displacement were predicted to be of low magnitude and not significant.

Site	No. of turbines	Distance to Proposed Development (km)	Site status	Baseline ornithology surveys	Goshawk
Windy Standard I (operational)	36	6.9 km	Operational	1993 - 1995	Windy Standard I was submitted prior to the current assessment requirements for EIA however no greater than low magnitude non-significant effects have been predicted for any ornithological feature as a result of the construction and operation of any of the Windy Standard Complex wind farms. These turbines will be decommissioned and replaced by Windy Standard I Repower if consent is granted.
Windy Standard I Repower	8	6.7 km	Submitted	2020	A single goshawk was recorded during breeding raptor surveys, flushed from a forestry ride in the west of the survey area. The impact of disturbance and/or displacement were predicted to be of low magnitude and not significant.
Knockkippen	12	7.5 km	Submitted	2020 - 2021	A total of 10 flights by single goshawk was recorded all at PCH, however, no CRM was undertaken. There was no evidence of goshawk breeding within the survey area. No assessment was provided.
Afton	25	7.5 km	Operational	2003 - 2004	Goshawk was not recorded during baseline surveys. As such, no assessment was provided.
Polquhairn	9	8.4 km	Consented	2012 - 2013	Goshawk was not recorded during baseline surveys. As such, no assessment was provided.
Dersalloch	23	8.5 km	Operational	2003 - 2006	There was no evidence that goshawk bred within the survey area. As such, no assessment was provided.
Scienteuch	10	9.1 km	Submitted	2019 - 2021	Twelve flights by 13 birds in total were recorded during the breeding season VP surveys, of which four flights by single birds were at PCH. Seven flights by single birds were recorded during the non-breeding season VP surveys, of which three were at PCH. CRM predicted an annual collision mortality of 0.18 birds, representing 0.29% of the NHZ 19 population estimate and 0.08% of the breeding population in Scotland. Two goshawk pairs were recorded displaying within the survey area in 2020, with a female also recorded in 2021. However, no further evidence of breeding was recorded. The impacts of disturbance and/or displacement were considered to be of negligible magnitude, and collision risk was considered to be of low negative magnitude. All predicted impacts were considered to be not significant.
Windy Rig	12	9.4 km	Operational	2013 - 2015	Two flights by single birds were recorded during the breeding season VP surveys in 2014, neither of which were at PCH. An incidental record of a single goshawk was recorded during ecology surveys, however, no evidence of breeding was recorded. Any impact of predicted effects on goshawk were considered to be of negligible magnitude and not significant.
Cumulative residual effects	371	<p>Whilst it is acknowledged, within several of the EIAR chapters reviewed, that goshawk is a secretive species and can often be overlooked during surveys, this CIA takes into account seventeen developments. Overall, a total of 56 flights across seventeen developments were recorded at PCH and up to six breeding territories (possible/probable/confirmed) were identified.</p> <p>CRM was carried out for four of the developments considered in this CIA, with a total annual collision mortality estimate of 0.5 birds, representing 0.78% of the NHZ 19 population and 0.19% of the breeding population in Scotland. CRM was not carried out for goshawk flights recorded during baseline surveys of the Proposed Development as no flights were recorded at PCH in the CRZ. The impact of collision risk was considered to be of low negative/negligible magnitude and not significant across all four developments. A cumulative impact of collision risk is therefore considered to be of low negative magnitude and not significant.</p> <p>Of the 17 developments reviewed, four reported breeding behaviour by goshawk during baseline surveys. Of these developments, one reported two confirmed territories and another reported a possible territory. The other two reported breeding behaviour, however, no territories were identified. Potential disturbance and/or displacement of up to six breeding territories represents 4.62% of the breeding population in Scotland. However, the impact of disturbance and/or displacement was considered to be moderate-low/negligible magnitude across all four developments, as effects are expected to be temporary. A cumulative impact of disturbance and/or displacement is therefore considered to be of moderate negative magnitude but not significant.</p>			

Source: Natural Power

7.9. Conclusions

7.9.1. One IOF, goshawk, was identified in the context of the Proposed Development. There are no predicted significant effects on goshawk as a result of the Proposed Development, including cumulative effects. Additionally, there are no predicted significant effects on other ornithological features recorded during baseline ornithology surveys for the Proposed Development.

7.10. Further Mitigation and Residual Effects

- 7.10.1. The Proposed Development is predicted to have a low negative/negligible impact on goshawk, and a negligible impact on all other ornithological features assessed within this Chapter. These impacts are considered to result in effects that are not significant. A summary of pre-mitigation and residual effects on IOF, goshawk, is provided in Table 7.14.
- 7.10.2. For all ornithological features, although no species-specific mitigation is required, various embedded measures (described in Section 7.7) will be implemented to ensure compliance with legislation, and to follow good practice guidance with regard to breeding birds. In addition, an outline BERP has been prepared which includes measures for habitat enhancements and ornithological monitoring and is provided as Appendix X, Volume 3 of the EIAR.

Table 7.14: Summary of pre-mitigation effects and residual effects on each IOF, and the residual significance of effect

IOF	Conservation importance	Nature of potential pre-mitigation impact	Magnitude of pre-mitigation impact	Significance of pre-mitigation effect	Specific mitigation/compensation measure	Magnitude of residual impact	Residual significance	Level of certainty
Construction/Decommission								
Goshawk	Local	Habitat loss	Low negative	Not significant	No specific mitigation required	Low negative	Not significant	Confidence in the prediction: high
		Disturbance and/or displacement	Low negative	Not significant	No specific mitigation required (after implementation of embedded mitigation)	Negligible	Not significant	Confidence in the prediction: high
Operation								
Goshawk	Local	Disturbance	Low negative	Not significant	No specific mitigation required (after implementation of embedded mitigation)	Negligible	Not significant	Confidence in the prediction: high
		Displacement	Low negative	Not significant	No specific mitigation required	Low negative	Not significant	Confidence in the prediction: high
		Collision risk	Negligible	Not significant	No specific mitigation required	Negligible	Not significant	Confidence in the prediction: high

Source: Natural Power

7.11. Statement of Significance

- 7.11.1. An assessment has been made of the predicted significance of effects of the Proposed Development on ornithological features. The Proposed Development includes for a 50 m micrositing allowance where the environmental impacts would be assessed and signed-off by the ECoW.
- 7.11.2. By applying effective embedded mitigation measures and following good practice guidelines during construction, the magnitude of residual effects of the Proposed Development on goshawk is assessed as being **low negative/negligible** in terms of magnitude, and thus **not significant** in the professional judgment of Natural Power.