Chapter 7 Ornithology

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List of Abbreviations

Abbreviation	Description
BBS	Breeding Bird Survey
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
EC	European Commission
EcIA	Ecological Impact Assessment
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
ES	Environmental Statement (now superseded by EIA Reports)
GET	Golden Eagle Topographical (Model)
HMP	Habitat Management Plan
HBRG	Highland Biological Recording Group
HRA	Habitats Regulations Appraisal
HRSG	Highland Raptor Study Group
IOF	Important Ornithological Feature
JNCC	Joint Nature Conservation Committee

LBAP	Local Biodiversity Action Plan
MAGIC	Multi-Agency Geographic. Information for the Countryside
NHZ	Natural Heritage Zones
OS	Ordnance Survey
PAN	Planning Advice Note
PCH	Potential Collision Height
RSPB	Royal Society for the Protection of Birds
SBL	Scottish Biodiversity List
SEPA	Scottish Environmental Protection Area
SNH	Scottish Natural Heritage (former name of NatureScot)
SOC	Scottish Ornithologist's Club
SPA	Special Protection Area
SPP	Species Protection Plan
SRMS	Scottish Raptor Monitoring Scheme
SSSI	Site of Special Scientific Interest
SWBSG	Scottish Windfarm & Bird Steering Group
T	Turbine
VP	Vantage Point
WCA	Wildlife and Countryside Act
ZoI	Zone of Influence

7. Ornithology

7.1 Executive Summary

7.1.1 In order to inform the EIA, 18 months of ornithological survey work was undertaken at the Proposed Development between March 2018 and August 2019 (two breeding seasons and one non-breeding season). NatureScot agreed that a second non-breeding season survey was not required at the Proposed Development. Surveys comprised of VP flight activity surveys, BBS, raptor and black grouse surveys.

7.1.2 An assessment has been made of the predicted significance of effects of the Proposed Development on ornithological interests. This assessment predicted no significant effect, on all of the IOFs recorded. In addition, six capercaillie (*Tetrao urogallus*) SPAs within 25 km of the Proposed Development have been taken forward for Appropriate Assessment. These are dealt with in a separate HRA Screening document.

7.1.3 Habitat enhancement measures targeted at hen harrier (*Circus cyaneus*), merlin (*Falco columbarius)* and short-eared owl (*Asio flammeus*) (heather management to encourage areas of deep heather) and curlew (*Numenius arquata*) and golden plover (*Pluvialis apicaria*) (blanket bog restoration) are proposed. Embedded mitigation measures are proposed to minimise impacts of the construction and operation of the Proposed Development on IOFs, and to prevent a breach of legislation under the Wildlife and Countryside Act (1981) as amended by the Nature Conservation (Scotland) Act (2004). A Species Protection Plan (SPP) is proposed and good practice guidance regarding breeding birds will be followed, with an ECoW employed during construction. It is considered that implementation of these embedded mitigation and habitat enhancement measures will reduce the likelihood of impacts on IOFs at the appropriate biogeographical scale.

7.2 Introduction

7.2.1 This EIA chapter considers the potential effects of the Proposed Development on important ornithological features (IOFs). It details the methods used to identify the baseline bird community within the Proposed Development and surrounding locale, and the process used to determine the nature conservation value of the bird populations present. The chapter then sets out the potential impacts of the Proposed Development on birds during the construction, operation and decommissioning phases, and assesses the significance of potential effects on bird populations, including cumulative effects, at an appropriate bio-geographic scale. An assessment of residual effects, taking into consideration proposed mitigation measures, is also provided. Non-avian ecology is assessed in **Chapter 8: Ecology**, of the Environmental Impact Assessment (EIA) Report and complements this chapter.

7.2.2 This chapter has been prepared by suitably qualified and experienced ecologists following an extensive scoping process culminating in a Scoping Report issued in January 2021 (see **Appendix 4.1**). The approach to scoping was to agree the scope of the assessment with stakeholders so that it is proportionate and focussed on those (IOFs) where significant impact in the absence of mitigation is more likely.

7.2.3 Following submission of the Scoping Report, and subsequent consultation, this assessment focusses only on those features which have the potential to be subjected to significant effects by the Proposed Development, or for which the predicted effects are currently unknown, in line with the updated *Chartered Institute of Ecology and Environmental Management* (CIEEM) guidelines (CIEEM, 2018).

7.2.4 The following ornithological features were recorded during baseline surveys but were subsequently scoped out of further assessment during the scoping process following agreement with NatureScot:

- Osprey (*Pandion haliaetus*);
- Lapwing (*Vanellus vanellus*);
- all 'secondary' species recorded during flight activity surveys; and
- all passerine species.

7.2.5 Additionally, the Moray and Nairn Coast Special Protection Area (SPA) and Ramsar site and Inner Moray Firth SPA and Ramsar site were scoped out ahead of undertaking the Screening for Habitats Regulations Appraisal (HRA). Survey methods, survey results and impact assessment are therefore not provided for these features in this chapter. Baseline survey results for these features can be found in the Scoping Report for the Proposed Development (refer to **Appendix 4.1**).

7.2.6 Potential impacts of the construction, operational and decommissioning phases have been reviewed, with particular attention paid to species of high vulnerability and conservation concern (species listed under Annex I of the EC Birds Directive, Schedule 1 and Schedule 1A, red-listed Birds of Conservation Concern (BoCC), Scottish Biodiversity List (SBL) or Local Biodiversity Action Plan (LBAP) species).

7.2.7 The baseline surveys were carried out over an 18-month period: between March 2018 and August 2019 (see **Section 7.5** and **Appendix 7.1** for further details). It was agreed with NatureScot that 18 months of baseline surveys were likely to be sufficient to describe the baseline conditions of the Proposed Development. A combination of desk study and baseline ornithological survey results were used to assess the ornithological baseline conditions (see **Section 7.5**).All Latin names for species mentioned in this chapter are also listed in the **Appendix 7.1**.

7.2.8 **Table 7.1** below contains a list of Figures and Appendices associated with this chapter.

Table 7.1: Ornithology Figures and Appendices

Number	Title
Figure 7.1	Vantage Point Locations and Viewsheds
Figure 7.2	Site and Ornithological Survey Areas
Figure 7.3	Designated Ornithological Sites within 25 km of the Proposed Development
Figure 7.4	Breeding Season 2018 VP Survey Results (Mar - Aug): Raptors
Figure 7.5	Breeding Season 2019 VP Survey Results (Mar - Aug): Raptors
Figure 7.6	Breeding Season 2018 VP Survey Results (Mar - Aug): Other Species
Figure 7.7	Breeding Season 2019 VP Survey Results (Mar - Aug): Other Species
Figure 7.8	Non-breeding Season 2018/19 VP Results (Sep 2018 – Feb 2019)
Figure 7.9	2018 BBS Survey Results: Non-Passerines
Figure 7.10	2018 BBS Survey Results: Passerines

Number	Title
Figure 7.11	2018 Raptor Survey Results (in Appendix 7.2)
Figure 7.12	2019 Raptor Survey Results (in Appendix 7.2)
Figure 7.13	2018 and 2019 Black Grouse Survey Results (in Appendix 7.2)
Figure 7.14	Golden Eagle Topography Model Output
Appendix 7.1	Technical Appendix
Appendix 7.2	Confidential Appendix
Appendix 7.3	Screening for HRA

Terminology

7.2.9 The following areas are defined within this chapter:

- The 'Proposed Development': the turbines and all associated infrastructure required for Lethen Wind Farm.
- The 'site': all land within the application boundary.
- The 'site boundary':
  - 'Previously proposed site boundary' relates to the boundary before changes were made in early 2019 to the site boundary and turbine layout.
  - 'Site boundary' is the proposed application boundary for the Proposed Development.
- The 'ownership boundary': land owned by the Lethen Estate.
- The 'Collision Risk Zone' (CRZ): this is the area derived by applying a buffer around each turbine with a radius equal to the length of the turbine blades, plus an additional precautionary 200 m (SNH, 2009b).
- The 'survey area': describes the area within which the ornithological surveys took place and refers to the previously proposed site boundary plus a defined surrounding buffer area which is stated in the methodology for the species/group being surveyed.
- The 'Zone of Influence (ZoI)': this is "the area over which ecological features may be subject to significant effects as a result of the proposed project or associated activities" (CIEEM, 2018).

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 5: Legislative and Policy Context** and **Chapter 8** of the EIA Report. Legislative and guidance documents with specific relevance to ornithology are listed below:

Legislation

- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations), which transposed the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora) and elements of the Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds) into UK law;
- The Conservation of Habitats and Species Regulations 2017 (as amended), relating to reserved matters in Scotland;

- Wildlife and Countryside Act (WCA) 1981 (as amended) which transposed elements of the Birds Directive into UK law;
- The Nature Conservation (Scotland) Act 2004;
- The Wildlife and Natural Environment (Scotland) Act 2011;
- Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, which transposed the EIA Directive (Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment) into the Scottish planning system; and
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, which transposed the EIA Directive into the Scottish system for considering applications for consent under Sections 36 and 37 of the Electricity Act 1989.

National Policy Guidance

- Planning Advice Note (PAN) 51: Planning, Environmental Protection and Regulation (Scottish Government, 2006);
- Planning Advice Note (PAN) 60: Planning for Natural Heritage (Scottish Government, 2000);
- PAN 1/2013 – Environmental Impact Assessment (Scottish Government, 2013);
- Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives: Scottish Executive Circular 6/1995 as amended (Scottish Executive, 1995); and
- EU Exit: The Habitats Regulations in Scotland (Scottish Government, December 2020).

Other Guidance

- Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018);
- Recommended bird survey methods to inform impact assessment of onshore wind farms (SNH, 2017a);
- Birds and Wind Farms: Risk Assessment and Mitigation (de Lucas *et al.*, 2007);
- Developing field and analytical methods to assess avian collision risk at wind farms (Band *et al.*, 2007);
- Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action (SNH, 2000);
- Assessing significance of impacts from onshore windfarms on birds outwith designated areas (SNH, 2018a);
- Monitoring the impacts of onshore wind farms on birds (SNH, 2009a);
- Guidance on methods for monitoring bird populations at onshore wind farms (SNH, 2009b);
- Avoidance rates for the onshore NatureScot wind farm collision risk model (SNH, 2017b);
- Assessing the cumulative impact of onshore wind farms on birds (SNH, 2018b);
- Good Practice during Wind Farm Construction (Scottish Renewables *et al.*, 2019);
- Assessing connectivity with Special Protection Areas (SPAs) (SNH, 2016);
- A Review of Disturbance Distances in Selected Bird Species (Ruddock and Whitfield, 2007);
- British Standard 42020:2013 Biodiversity – code of practice for planning and development;
- Natural Heritage Zone (NHZ) bird population estimates. Scottish Windfarm Bird Steering Group (SWBSG). Commissioned report number 1504 (Wilson *et al.*, 2015);
- Bird Monitoring Methods (Gilbert *et al.*, 1998);
- A method for censusing upland breeding waders (Brown and Shepherd, 1993);
- Raptors: A Field Guide to Survey and Monitoring (Hardey *et al.*, 2013);
- Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man (Eaton *et al.*, 2015);

- Scottish Biodiversity List (SBL)[1]; and
- Highland Biodiversity Action Plan 2021-2026 (Highland Council, 2021) (draft)

7.4 Consultation

7.4.1 As per good practice guidelines, a Scoping Report for the Proposed Development was issued to a range of consultees in January 2021 (see **Appendix 4.1**). This document contained details of the proposed assessment methodology and ornithological features proposed for full Ecological Impact Assessment (EcIA) and those to be scoped out of the EcIA. Most ornithological features were proposed to be scoped out on the basis that construction and operation of the Proposed Development would not be likely to result in significant effects. However, the following ornithological features were scoped in:

- greylag goose (*Anser anser*);
- pink-footed goose (*Anser brachyrhynchus*);
- whooper swan (*Cygnus cygnus*);
- golden plover;
- curlew;
- snipe (*Gallinago gallinago*);
- common sandpiper (*Actitis hypoleucos*);
- golden eagle (*Aquila chrysaetos*);
- hen harrier;
- red kite (*Milvus milvus*);
- short-eared owl;
- merlin; and
- peregrine (*Falco peregrinus*).

7.4.2 Throughout the baseline survey period, ongoing consultations have taken place with NatureScot on the scope of the monitoring programme, and these are summarised in **Table** 7.2.

Table 7.2: Summary of Consultation with NatureScot during Baseline Survey Period

Date	NatureScot guidance/response
08 November 2018	NatureScot was provided with the first breeding season summary report and method statement and agreed that the proposed survey work for the forthcoming 2018/19 non-breeding season and the 2019 breeding season would be sufficient to assess the impacts of the Proposed Development.
04 March 2019	NatureScot was provided with further details of the 2018 Breeding Bird Survey (BBS) results and were asked about the necessity to undertake a second season of BBS. NatureScot stated their agreement that only one year's worth of BBS was required.
12 August 2019	NatureScot was provided with details of 2018/19 non-breeding season VP survey results and confirmed they were content that one year's worth of non-breeding season VP survey was sufficient.

7.4.3 Details of the responses from consultees on the scoping document and the resulting actions are provided in **Table 7.3** and in **Appendix 4.4**. Only aspects of the scoping responses with relevance to ornithology are included here; other aspects are addressed in the relevant chapters.

[1] Scottish Biodiversity List (SBL): https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy/scottish-biodiversity-list

Table 7.3: Consultee Scoping Responses Relating to Ornithology

Consultee and response date	Consultation Response	Applicant Action
NatureScot 09 March 2021	NatureScot stated that the EIA Report should include information to inform the competent authority's HRA for Darnaway and Lethen SPA and five Strathspey capercaillie SPAs. They recommended contacting the Royal Society for the Protection of Birds (RSPB) Capercaillie Officer to receive up to date capercaillie information and data.	The RSPB Capercaillie Officer was contacted to seek advice regarding information to inform the HRA and to request up to date capercaillie records. Capercaillie records within 10 km of the Proposed Development were received from the RSPB covering the period 2019 – 2020. Information to inform HRA of the specified SPAs is provided within **Appendix 7.3**.
	NatureScot expressed their concerns about survey methodology with regards to survey buffers, in particular raptor surveys, recommending that a further year of ornithology survey work was undertaken.	Further consultation was undertaken with NatureScot with regards to this concern. Further details of the suitability of the completed survey effort and measures taken to address any gaps were provided to NatureScot. Details of this can be found in **Section 7.5** (Information Gaps). Following receipt of the letter, NatureScot agreed that no further baseline surveys were required (phone call and follow up email dated 26 May 2021).
RSPB 04 March 2021	The RSPB were content that the correct designated sites have been scoped into the assessment and welcomed the inclusion of the capercaillie SPAs.	Alongside the EIA chapter a document covering the information to inform HRA of the specified SPAs is provided in **Appendix 7.3**.
	The RSPB questioned the survey methodology with regards to survey buffers and Vantage Point (VP) viewsheds, recommending that a further year of ornithology survey work was undertaken.	Further consultation was undertaken with RSPB with regards to this concern (email dated 1st June 2021). Further details of the survey effort and measures taken to address any gaps as well as NatureScot's updated response were provided to the RSPB. Details of measures can be found in **Section 7.5** (Information Gaps). The RSPB noted that NatureScot was no longer requiring a further year of ornithological surveys (email dated 17th June 2021).
	The RSPB questioned the sufficiency of surveys undertaken around the Proposed Development access route as this had not yet been confirmed at the time of writing the Scoping Report.	The access route has since been identified as the pre-existing Tom nan Clach Wind Farm track, which will not require upgrading. As such, no further surveys were required.

Consultee and response date	Consultation Response	Applicant Action
	The RSPB recommended that black grouse and capercaillie should be scoped into the EIA report.	Black grouse and capercaillie have been considered within this EIA chapter.
	The RSPB advised that the Golden Eagle Topographical (GET) model be included to show areas of high landscape use and if relevant (depending on results of desk based and VP surveys), use of this tool to inform the Proposed Development layout.	The GET model is included in the golden eagle assessment and shown in **Figure 7.14**.
East Nairnshire Community Council 15 March 2021	The East Nairnshire Community Council stated that there are locally nesting red kite and nesting golden eagle which may be impacted by a concentration of wind turbines.	No red kite or golden eagle nests were found within the site and there was no suitable habitat for either species to nest within the site. The desk study has identified records of breeding raptors within the wider area. Golden eagle and red kite are fully assessed in **Section 7.8**.
	The East Nairnshire Community Council stated that an over concentration of wind farm developments will result in loss of endangered raptor species such as golden eagle and red kite.	Cumulative impact assessment has been carried out for golden eagle and red kite (**Section 7.11**).

7.5 Assessment Methods and Significance Criteria

Desk study

7.5.1 A desk study was undertaken to collate relevant survey data, public domain survey data, and to obtain historical records of protected and relevant species from within the site boundary and surrounding environment. The original desk-based review was undertaken as part of the feasibility study in 2019 to help inform and guide the baseline ornithological field surveys. This review was updated in 2021 to provide context to the results of the ornithological field surveys, and to put the populations of target bird species recorded at the Proposed Development into context in terms of their regional importance.

7.5.2 In order to assess any connectivity between ornithological features recorded on site with populations protected on designated sites, an online search was made for all sites with an international or national designation for ornithological interests within a 10 km radius of the site boundary and extended to 25 km for those sites with geese and gulls listed as a qualifying feature (due to the relatively large foraging ranges of these species). Following a scoping response from NatureScot (see **Table 7.2**), sites with capercaillie as a qualifying feature that lie within 25 km were also included in the search. The search included SPAs, Ramsar sites, and Sites of Special Scientific Interest (SSSIs). The following sources were accessed to obtain information on designated sites;

- Joint Nature Conservation Committee (JNCC) website[2];

[2] http://www.jncc.gov.uk

- NatureScot Sitelink website[3]; and
- Online GIS tool MAGIC (Multi-Agency Geographic Information for the Countryside)[4].

7.5.3 In addition, the following organisations were contacted in June 2021 to request any records they hold from within 10 km of the central point of the site within the last 10 years (2011 – 2020 inclusive):

- Highland Biological Recording Group (HBRG);
- Highland Raptor Study Group (HRSG); and
- RSPB.

Target Species

7.5.4 The ornithological surveys carried out at the Proposed Development followed NatureScot guidance (SNH, 2017a), which recommends that surveys should focus on protected species and other species of conservation concern, with reference to the following three lists:

- Species listed under *Annex I* of the EC Birds Directive;
- Species listed under *Schedule 1* and *Schedule 1A* of the WCA 1981 (as amended); and
- Red-listed BoCC.

7.5.5 In addition, NatureScot recommends that special consideration should also be given to species identified as being of regional and local conservation concern within the SBL and LBAPs; and any other species occurring in particularly high concentrations at a site.

7.5.6 Within these lists, NatureScot recommends that the greatest attention during VP surveys 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).

7.5.7 In accordance with NatureScot guidance (SNH, 2017a), surveys focused on the following target species:

- all raptors and owls listed in *Annex* I of the EC Birds Directive and/or *Schedule 1* and *1A* of the WCA 1981 (as amended);
- all species of swans and geese (with the exception of Canada goose (*Branta canadensis)* and mallard (*Anas plathrhynchos)*);
- black grouse (*Tetrao tetrix)* and capercaillie; and
- all wader species.

7.5.8 Secondary species[5] included the following:

- all other waterfowl (e.g., mallard and including grey heron (*Ardea cinerea)*);
- all other raptors;
- raven (*Corvus corax*);
- crossbill species; and
- any large aggregations of red-listed passerines.

[3] https://sitelink.nature.scot/home

[4] https://magic.defra.gov.uk/MagicMap.aspx

[5] 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. Some secondary species may be targets at some sites (e.g., near an SPA designated for gull species).

Ornithological Surveys

Survey Programme

7.5.9 In order to assess the potential effects of a wind farm on birds, both the value of the site itself to birds and the level of flight activity within and around the site should be determined. In view of the target species identified as potentially occurring within the Proposed Development, and following consultation with NatureScot, the surveys listed below were undertaken, in line with NatureScot guidance (SNH, 2017a):

- Breeding season VP surveys (March to August 2018, inclusive; March to August 2019, inclusive);
- Non-breeding season VP surveys (September 2018 to February 2019, inclusive);
- Breeding raptor surveys: April to July 2018 and 2019;
- Black grouse lek surveys: March to May 2018 and 2019; and
- BBS: April to July 2018.

7.5.10 The methodology for the baseline ornithology surveys outlined above is provided in the **Appendix 7.1** and summarised below. Further VP method details, along with dates for species-specific survey visits, are given in **Appendix 7.1**.

Vantage Point Surveys

7.5.11 Flight activity surveys from VP locations were carried out following methods advocated by NatureScot guidance (SNH, 2017a). This method focuses on identifying flight paths and flight heights of target species, such as wildfowl and raptors, and allows any regular patterns of flight lines to be identified, allowing turbine locations to be designed to minimise collision risk to birds. The data generated can also be used to estimate the theoretical collision risk of a particular species.

7.5.12 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). Flight activity of secondary species was also recorded in accordance with NatureScot guidance.

7.5.13 VP surveys were undertaken during the breeding season 2018, non-breeding season 2018/19 and breeding season 2019 to complete a full 18 months of baseline monitoring. These surveys were used to record the flight activity of target species within the vicinity of the Proposed Development.

7.5.14 Three VPs were used to carry out the VP surveys with viewsheds covering the locations of the proposed turbines. The VP locations were carefully selected based on viewshed analysis and a ground-truthing site visit prior to surveys commencing (**Figure 7.1**):

- VP1 was located in the east of the Proposed Development, north of Carn nam Clach Garbha, at grid reference 294171, 836201;
- VP2 was located in the south-east of the Proposed Development, south-west of Carn nan Clach Garbha, at grid reference 293545, 833565; and
- VP3 was located in the west of the Proposed Development, at grid reference 291850, 836426.

7.5.15 Following NatureScot guidance (SNH, 2017a) a minimum of 36 hours of survey effort was undertaken at each VP during each season (full details of VP survey effort can be found in **Appendix 7.1**).

7.5.16 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 four

height bands: (1) less than 25 m, (2) 25 to 50 m, (3) 50 to200 m, (4) >200 m. These height bands are subsequently referred to as height bands 1, 2, 3 and 4.

Breeding Bird Surveys

7.5.17 Breeding bird surveys were undertaken in 2018, following standard NatureScot guidance (SNH, 2017a). These surveys covered all parts of the previously proposed site boundary plus a 500 m buffer, access permitting (see **Paragraphs 7.5.52-7.5.53** for further information regarding survey access limitations and **Figure 7.2** for survey areas).

7.5.18 The surveys followed the widely used Brown & Shepherd (1993) methodology, but utilising four survey visits, as is currently recommended (Calladine *et al.,* 2009). Due to the large extent of the survey area, each visit consisted of four days of survey effort in order to fully cover all open ground.

7.5.19 The NatureScot recommendation is that only waders, skuas, gulls, red grouse (*Lagopus lagopus*) and some wildfowl species are targeted during BBS, and moorland passerine species do not need to be recorded. However, all bird species encountered were recorded during the BBS undertaken at the Proposed Development in order to provide a complete picture of the ornithological community present on site.

7.5.20 Upon completion of the fourth survey visit, records from all visits were combined and analysed to estimate the location of breeding territories, based upon the territory analysis method outlined in Bibby *et al.*, (2000).

Breeding Raptor Surveys: 2018 and 2019

7.5.21 Dedicated breeding raptor surveys, covering the previously proposed site boundary and a 2 km buffer, access permitting (see **Paragraphs 7.5.52** and **7.5.54** for further information regarding survey access limitations and **Figure 7.2** for survey areas), were carried out during 2018 and 2019. The details of these surveys can be found in **Appendix 7.1**. The nature of these surveys was determined by the target species recorded during the VP surveys and BBS and by those species considered to have the potential to breed within the survey area based upon the available habitat and desk study results. Surveys involved a mixture of walkovers and short VP watches to identify potential breeding sites and, where possible, to monitor productivity. Regular scanning for raptors was undertaken both within the site and by watching the surrounding area, thus covering ground not covered by the standard VP flight activity surveys. Surveys were undertaken by experienced surveyors holding a Schedule 1 Licence. Species-specific survey methods were informed by the methods outlined in Gilbert *et al*. (1998) and Hardey *et al*. (2013).

7.5.22 In addition to the stated baseline surveys, HRSG also carried out raptor monitoring on the Proposed Development estate in 2018 and 2019. Information was passed between the two parties regarding raptor observations on site and this was used to confirm nest locations. Inspection of confirmed nests was undertaken only by HRSG in order to minimise disturbance to breeding birds.

Black Grouse Surveys

7.5.23 Dedicated black grouse surveys were carried out in spring 2018 and 2019 following methods outlined in The National Black Grouse Survey Instructions (Etheridge and Baines, 1995; summarised in Gilbert *et al.* 1998).

7.5.24 The surveys covered the previously proposed site boundary plus a 1.5 km buffer, access permitting (see **Paragraphs 7.5.52** and **7.5.55** for further information regarding survey access limitations and **Figure 7.2** for survey areas). Three survey visits were undertaken in 2018, with the first visit undertaken in daylight to determine areas of suitable habitat for lekking black

grouse. Therefore, only two visits were required in 2019, both with the purpose of surveying lekking black grouse.

Collision Risk Modelling

7.5.25 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 CRZ at potential collision height (PCH) (i.e., the height at which rotor blades sweep), as per the Band *et al*. (2007) collision risk model recommended by NatureScot (SNH, 2017a). Sufficient flight activity was defined as three or more flights or more than ten individuals at PCH in the CRZ. Thus, species that rarely pass through the Proposed Development Area and which are not considered to be at risk of significant effects, did not undergo CRM.

7.5.26 For the purposes of this EcIA, flights which pass through or touch a 275 m buffer of the proposed turbine locations are considered to be in the CRZ.

7.5.27 CRM was run based on a layout of 17 turbines of 185 m height (to blade tip), with blade lengths of 75 m and hub height of 110 m. Therefore, for the purposes of the EcIA, the turbine swept height shall be between 35 m and 185 m altitude. Using the height bands recorded during the VP surveys, all flights in height band 2 (25-50 m) and height band 3 (50-200 m) were included in the CRM, although this will be a precautionary approach as some flights at the lower end of height band 2 and higher end of height band 3 will lie outside the actual PCH. Flights recorded in height band 1 are below PCH and flights recorded in height band 4 are above PCH. Only records at PCH within the collision risk zone (CRZ) (blade width plus 200 m buffer) are used within the CRM.

7.5.28 For species that usually fly in approximately straight lines ('directional approach'), such as geese and ducks, flights observed are extrapolated up in order to estimate the number of individuals likely to pass through the CRZ at PCH per season or year. This type of analysis was carried out for pink-footed goose, greylag goose and whooper swan.

7.5.29 For species that generally fly non-directionally ('random approach'), the observed time spent flying within the risk area is calculated and similarly extrapolated up per season or year across the whole risk area. This type of analysis was used to estimate collisions for curlew, hen harrier, red kite, merlin and golden eagle. During random approach modelling, average flight activity per unit effort (measured in minutes of survey time and hectares of area surveyed) is calculated. This metric is then used to extrapolate flight activity across time and across the entirety of the CRZ to estimate the total flight activity across the site per year (or season). The underlying assumption behind this is that the surveys provide a representative sample of flight activity over time and in space.

7.5.30 The number of flights or flight activity are then used to estimate the number of birds expected to pass through the rotor swept area or volume respectively and combined with the probability of a bird colliding with a blade if it does pass through the rotor swept area, to give a predicted number of collisions in the absence of avoidance behaviour. This is then combined with a parameter representing avoidance behaviour likely to be displayed by birds flying towards turbine blades. Collision estimates were calculated based on a range of avoidance rates including recommended species-specific avoidance rates (SNH, 2017b).

Impact Assessment Methodology

7.5.31 This section summarises how the significance of effects on the ornithological interests at the Proposed Development was assessed. The approach used for the assessment of ornithological effects followed the guidance produced by CIEEM (2018).

Evaluating Ornithological Features

7.5.32 The assessment process involves identifying IOFs, in accordance with CIEEM guidelines (2018). These ornithological features and their values are determined by the criteria defined in **Table 7.4**. It should be noted that these criteria are intended as a guide and are not definitive; professional judgement has also been applied in determining value level for ornithological features.

Table 7.4: Approach Used to Evaluate Ornithological Features by Defined Geographical Context

VALUE LEVEL	EXAMPLES
International	A regularly occurring species listed as a qualifying feature of an internationally designated site (e.g., SPA or Ramsar wetland site) within the ZoI 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.
National	A regularly occurring species listed as a qualifying feature of a nationally designated site (e.g., SSSI) within the ZoI of the Proposed Development. Species populations present with sufficient conservation importance to meet criteria for SSSI selection (Drewitt *et al.*, 2020; Woodward *et al.*, 2020a).
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 e.g., important in the context of NatureScot Natural Heritage Zone (NHZ) populations.
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 (Eaton *et al.*, 2015) or LBAP listed.
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 (Eaton *et al.*, 2015)).

7.5.33 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.

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

7.5.35 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 to the feature at the assigned value level arising from the Proposed Development, after the application of embedded measures.

Characterising Potential Effects on Ornithological Features

7.5.36 Effects on IOFs are judged in terms of magnitude and duration (CIEEM, 2018).

7.5.37 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. Magnitude is assessed within six levels, as detailed in **Table 7.5**.

Table 7.5: Approach Used to Evaluate Ornithological Features by Defined Magnitude

Impact Magnitude	Description
Very high adverse	Total or almost complete loss of a feature resulting in a permanent adverse effect on the integrity of the feature. The conservation status of the feature would be affected.
High adverse	Result in large-scale, permanent changes in a feature, and likely to change its ecological integrity. These impacts are therefore likely to result in overall changes in the conservation status of a feature.
Moderate adverse	Include moderate-scale long-term changes in a feature, or larger-scale temporary changes, but the integrity of the feature is not likely to be affected. This may mean that there are temporary changes in the conservation status of the feature, but these are reversible and unlikely to be permanent.
Low adverse	Include impacts that are small in magnitude, have small-scale temporary changes, and where integrity is not affected. These effects are unlikely to result in overall changes in the conservation status of a feature.
Negligible	No perceptible change in the ornithological feature.
Beneficial	The changes in the ornithological feature are considered to be beneficial to its integrity or nature conservation status.

7.5.38 Effects and spatial magnitude are assessed within the appropriate bio-geographic regions (SNH, 2018a). These are detailed below:

- Effects on breeding bird populations are assessed in a regional context. The appropriate regional bio-geographic unit has been identified by NatureScot as the Natural Heritage Zone (NHZ). NHZ classifications represent areas with a high level of bio-geographic coherence and are unrelated to administrative boundaries. Current NHZ population estimates are presented in Wilson *et al.* (2015).
- The Proposed Development lies within NHZ 10 (Central Highlands). Regional impacts are assessed within this area as far as is practicable/reasonable. Some species that were regarded as migratory (i.e., geese and swans) or transitory (i.e., red kite) species at the site were assessed against more appropriate NHZs such as NHZ 12, 16 and 21.

7.5.39 Where relevant, any potential impacts on migratory goose populations of conservation value are assessed at an international level, in context with local sites for which these species are qualifying features.

7.5.40 In the case of designated sites, spatial magnitude is assessed in respect of the area within the designated site boundary. For non-designated sites, spatial magnitude is assessed at an appropriate scale depending on the feature's importance, e.g., impacts on breeding bird populations are assessed in a regional context.

7.5.41 Duration is defined as the time for which the impact is expected to last before recovery, i.e., return to pre-construction baseline conditions (SNH, 2018a). This is summarised in **Table 7.6** below.

Table 7.6: 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 more than 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 to 25 years or longer; see above) Medium term (5 to 15 years) Short-term (up to 5 years)

7.5.42 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.

7.5.43 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 7.7** below. The judgement takes account of information available on the responses of birds to various stimuli (e.g., predators, noise and disturbance by humans).

Table 7.7 Criteria for Describing Sensitivity

Sensitivity	Definition
High	Species or populations occupying habitats remote from human activities, or that exhibit strong and long-lasting (guide: greater than 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 to 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.

7.5.44 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 forestry 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

7.5.45 Only features for which there is considered to be the potential for significant effects are identified as IOFs and taken forward for EcIA. 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 guidelines 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 **Paragraphs 7.7.22-**

7.7.34). 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.

7.5.46 Effects are more likely to be considered significant where the feature affected is of higher conservation importance or where the magnitude of the impact is high. Effects not considered to be significant would be those where the integrity of the feature is not threatened, effects on features of lower conservation importance, or where the magnitude of the impact is low.

7.5.47 With reference to CIEEM (2018), paragraph 5.25 provides "A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. A significant effect is a beneficial or adverse ecological effect that should be given weight in judging whether to authorise a project".

7.5.48 Where potential effects on an IOF of the Proposed Development are assessed as significant, specific mitigation measures are identified following the recognised hierarchy of 'avoid, minimise, off-set' in order to avoid, reduce and/or compensate' for potentially significant effects.

7.5.49 The significance of residual effects on features after the implementation of mitigation measures can then be determined, along with any monitoring requirements (in line with the recommendations outlined in NatureScot guidance (SNH, 2009b)).

Trends and predicted future baseline

7.5.50 In the absence of the Proposed Development, it is assumed that the land use within the site and the surrounding locale would remain the same for the foreseeable future. Current habitat use is grouse moorland with some sheep grazing and as such, large areas of blanket and modified bog habitats have been actively drained, patches of heather are periodically burned and a low level of predator control is undertaken. These measures will all have some impact upon the breeding community of birds present on site. In the absence of the Proposed Development this land use is likely to continue.

7.5.51 It is more difficult to predict changes that that may occur in the longer-term (i.e., over 35 years), especially in the wake of climate change, which is predicted to cause range shifts in some bird species. In addition, climate change may alter habitat types by impacting on the composition and health of the plant communities present, thereby affecting the suitability of the site for some of the species that currently occupy the site. Baseline surveys carried out for the Proposed Development represent a snapshot of the bird 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 site.

Information gaps

7.5.52 No access was permitted to the land that lies outside of the site to the north and west, during the ornithological baseline survey period. Therefore, these areas were surveyed from public roads and from the boundary of the site during raptor, BBS and black grouse surveys (see **Figure 7.2** for survey areas). The majority of the area where access was not allowed were of a similar habitat and nature to areas found within the site.

7.5.53 Access restrictions resulted in 5 % of the 500 m buffer of turbines not being surveyed directly on the ground during BBS visits. Much of this area was within 100 m of the site boundary and was therefore surveyed within guidelines set by NatureScot (SNH, 2017a). It was possible to

scan the rest of the area easily from the edge of the site, meaning that any target species (e.g., waders) in these areas were identifiable during the survey.

7.5.54 Access restrictions resulted in 34 % of the 2 km buffer of turbines not being surveyed directly on the ground during raptor survey visits. However, most of this area was easily visible from within the site due to the topography within the 2 km buffer, which was gently sloping: up to the west and down to the north. There were no features within the buffer such as hills or forestry that would prevent the detection of raptors displaying breeding behaviour. Most areas of suitable raptor nesting habitat in the raptor survey area were also within the site. Furthermore, surveys were undertaken alongside consultation with the HRSG. HRSG monitors all known hen harrier, merlin and golden eagle nests in the area surrounding the Proposed Development, including the whole of the 2 km buffer (6 km for eagles) of the site. Details of the hen harrier, merlin and golden eagle nests within this area monitored by HRSG between 2011 and 2020 are included in the **Confidential Appendix 7.2**, including nest locations and breeding success.

7.5.55 Access restrictions resulted in 30 % of the 1.5 km buffer of turbines not being surveyed directly on the ground during black grouse survey visits. However, suitable areas of black grouse lekking habitat were identified during an initial daytime survey visit and by looking at aerial photography, following NatureScot guidance (SNH, 2017a). Most areas where access was not permitted did not provide suitable black grouse lekking habitat due to the distance from woodland, terrain and vegetation height and composition. It was therefore possible to survey all areas of suitable black grouse lekking habitat within the 1.5 km buffer during black grouse surveys. The only area of suitable habitat not surveyed directly on the ground was the area to the north of the Proposed Development, near to the River Findhorn, which was surveyed from the public road by scanning and listening for lekking males. As it is possible to hear black grouse lekking calls from up to 1 km away, and surveys were undertaken during favourable weather conditions, it is considered that this survey was sufficient to identify any lekking grouse in this area.

7.5.56 The site boundary was altered in 2019 after the commencement of ornithology surveys. While all turbine locations are still located within the previously proposed site boundary and within the VP viewsheds, 6 % of the 500 m buffer of turbines was not covered by the VP viewsheds. Only 2.6 % of the 275 m buffer (the CRZ) was not covered by VP viewsheds. It is considered that 6 % (or 2.6 % of the CRZ) is not a significant loss of coverage. Furthermore, although the area was not fully covered by VP viewsheds (i.e., within a 2 km arc of the VP location) it was still visible from VPs 2 and 3. The area was within 2 km of VP 3 but just outwith the 180° arc and was within 3 km of VP 2 but outwith the 2 km viewshed. This means that any target species flying in this area would have been visible to surveyors. It is therefore highly unlikely that any species were missed as a result of the small loss of viewshed coverage in terms of the 500 m buffer of turbine locations.

7.5.57 No VP visit was undertaken at VP 2 in January 2019 due to weather constraints (see **Appendix 7.1**). Survey hours were instead completed during the early part of February 2019, meaning that the recommended level of survey effort was undertaken within the same season.

7.6 Baseline Conditions

Designated Sites

7.6.1 **Table 7.8** lists the designated sites within the vicinity of the Proposed Development, based upon the search criteria described in **paragraph 7.5.2** (see **Figure 7.3**).

Table 7.8: Summary of Protected Sites Designated for Ornithological Interest within 10 km of the Proposed Development (25 km for Geese, Gulls and Capercaillie)

Site	Designation	Distance from site	Designation Criteria
Darnaway and Lethen Forest	SPA	10.6 km	Capercaillie (breeding)
Anagach Woods	SPA	11.3 km	Capercaillie (breeding)
Kinveachy Forest	SPA	11.5 km	Capercaillie (breeding)
Craigmore Wood	SPA	12.4 km	Capercaillie (breeding)
Abernethy Forest	SPA/SSSI	13.0 km	Capercaillie (breeding)
Cairngorms	SPA	19.3 km	Capercaillie (breeding)
Moray and Nairn Coast	SPA/Ramsar	22.2 km	Greylag goose (non-breeding) Pink-footed goose (non-breeding) Waterfowl assemblages (non-breeding)
Inner Moray Firth	SPA/Ramsar	23.7 km	Greylag goose (non-breeding) Waterfowl assemblages (non-breeding)

Species of Note (Existing Data)

7.6.2 Following the second data request to RSPB and HRSG in June 2021, records have been collated covering the period 2008 to 2020 (inclusive). RSPB records cover all bird species within a 10 km of the central grid reference of the Proposed Development and a 20 km radius for geese. HRSG records cover a 10 km radius of the central grid reference of the Proposed Development.

7.6.3 A full list of all protected bird species from these data sets is provided in the **Appendix 7.1**. A total of 26 protected bird species and/or birds of conservation concern were recorded between 2008 and 2020 (22 species excluding passerines). This included five *Schedule 1* raptor species and six waders, some of which breed within the Proposed Development. These records are summarised below. Note that these records refer to individuals and are not necessarily indicative of breeding.

7.6.4 Schedule 1 raptor species recorded within 10 km of the Proposed Development comprise:

- Golden eagle;
- White-tailed eagle (*Haliaeetus albicilla*);
- Hen harrier;
- Red kite; and
- Merlin.

7.6.5 Wader species recorded within 10 km of the Proposed Development comprise:

- Oystercatcher (*Haematopus ostralegus*);
- Lapwing;
- Curlew;
- Woodcock (*Scolopax rusticola*);

- Snipe; and
- Redshank (*Tringa tetanus*).

7.6.6 Ornithological data received from the RSPB and HRSG represent a typical bird assemblage associated with upland moorland and forest habitat in this region of Scotland. The search did not highlight any species of note for which supplementary surveys were required.

Baseline Surveys

Vantage point: Breeding Season

7.6.7 The breeding season surveys (March-August) during both years recorded flight lines from a total of 12 target species. **Table 7.9** summarises levels of flight activity for each species and the level of flight activity in the CRZ at PCH. This shows that greylag goose and curlew were the most frequently recorded species, but pink-footed goose was recorded in the greatest numbers overall. The associated flight lines are shown in **Figures 7.5, 7.6, 7.7 and 7.8**.

Table 7.9: Results of the Breeding Season VP surveys in 2018 and 2019

Species	No. of flights (individuals)	No. of flights (individuals) in the CRZ at PCH
Greylag goose	83 (335)	32 (77)
Pink-footed goose	14 (543)	1 (50)
Unidentified goose	2 (62)	2 (62)
Osprey	1 (1)	1 (1)
Hen harrier	25 (25)	6 (6)
Red kite	16 (17)	12 (13)
Golden eagle	7 (7)	2 (2)
Golden plover	7 (8)	1 (1)
Curlew	62 (69)	11 (14)
Short-eared owl	9 (9)	0 (0)
Merlin	10 (13)	3 (5)
Peregrine	3 (3)	1 (1)

Vantage point: Non- Breeding Season

7.6.8 A total of seven target species were recorded during non-breeding season VP surveys between September 2018 and February 2019 (inclusive). Six of those species were also recorded during the breeding seasons; the only target species not recorded during breeding seasons was whooper swan. **Table 7.10** summarises levels of flight activity for each species and the level of flight activity which was at PCH. In terms of number of records, greylag goose was the most frequently recorded species. However pink-footed goose was recorded in greater numbers. The flight lines for the non-breeding season target species are shown in **Figure 7.9**.

Table 7.10: Results of the Non-breeding Season VP Surveys in 2018/19

Species	No. Of flights (individuals)	No. Of flights (individuals) in the CRZ at PCH
Greylag goose	9 (95)	3 (57)
Pink-footed goose	4 (295)	3 (235)
Whooper swan	6 (62)	3 (24)

Species	No. Of flights (individuals)	No. Of flights (individuals) in the CRZ at PCH
Hen harrier	3 (3)	0 (0)
Red kite	1 (1)	0 (0)
Golden plover	1 (2)	0 (0)
Peregrine	2 (2)	1 (1)

7.6.9 **Table 7.11** below summarises all baseline flights of target species which were recorded with a period in the CRZ and with a period at PCH. Only species for which there were a minimum of either three flights or ten individuals in the CRZ and at PCH (in either season) qualified for CRM. However, CRM was also run for golden eagle, despite only two flights (and individuals) being recorded as at risk, due to the sensitivity for this species. Those ornithological features for which CRM was undertaken are shown in bold text.

Table 7.11: Number of Flights and Individuals Recorded Passing Through the CRZ at PCH during VP Surveys

Species	Season	Total flights (individuals)	Risk flights (individuals)	CRM carried out
Curlew	Breeding	62 (69)	11 (14)	**Yes**
Greylag goose	Breeding	83 (335)	32 (77)	**Yes**
	Wintering	9 (95)	3 (57)	**Yes**
Golden plover	Breeding	7 (8)	1 (1)	No
	Non-breeding	1 (2)	0 (0)	No
Hen harrier	Breeding	25 (25)	6 (6)	**Yes**
	Non-breeding	3 (3)	0 (0)	No
Red kite	Breeding	16 (17)	12(13)	**Yes**
	Non-breeding	1 (1)	0 (0)	No
Golden eagle	Breeding	7 (7)	2 (2)	**Yes**
Merlin	Breeding	10 (13)	3 (5)	**Yes**
Osprey	Breeding	1 (1)	1 (1)	No
Peregrine	Breeding	3 (3)	1 (1)	No
	Non-breeding	2 (2)	1 (1)	No
Pink-footed goose	Breeding	14 (543)	1 (50)	**Yes**
	Wintering	4 (295)	3 (235)	**Yes**
Short-eared owl	Breeding	9 (9)	0 (0)	No
Unidentified goose	Breeding	2 (62)	2 (62)	**Yes***
Whooper swan	Non-breeding	6 (62)	3 (24)	**Yes**

**These flights were incorporated into both the pink-footed goose and greylag goose estimates.*

7.6.10 Secondary and incidental records for breeding and non-breeding season VP surveys are summarised in **Appendix 7.1**.

Moorland Breeding Bird Survey

7.6.11 The results of the breeding bird survey and subsequent territory analysis are presented in **Table 7.12**.

7.6.12 A total of 23 species were recorded across the breeding bird survey area, of which 13 species were considered to have held territories that overlapped with the survey area (previously proposed site boundary, plus a 500 m buffer) (**Table 7.12**). The locations of these territories (mapped by estimated central point) are shown in **Figure 7.10** (non-passerines) and **Figure 7.11** (passerines).

Table 7.12: Estimated Number of Breeding Territories within the Site Boundary and 500 m Buffer in 2018

Species	Estimated Number of Territories
Greylag goose	3
Red grouse	36
Golden plover	10
Curlew	14
Snipe	9
Common sandpiper	2
Sand martin (*Riparia riparia*)	5*
Skylark (*Alauda arvensis*)	84
Willow warbler (*Phylloscopus trochilus*)	10
Wren (*Troglodytes troglodytes*)	13
Lesser redpoll (*Acanthis cabaret*)	3
Stonechat (*Saxicola torquata*)	7
Meadow pipit (*Anthus pratensis*)	173

*One colony with five breeding pairs

Breeding Raptor Surveys

7.6.13 The results of the dedicated breeding raptor surveys carried out during 2018 and 2019 are shown in the **Confidential Appendix 7.2** (which includes **Figure 7.12** (2018 results) and **Figure 7.13** (2019 results)).

7.6.14 The 2018 and 2019 surveys relating to the monitoring of hen harrier and merlin were undertaken in conjunction with the HRSG.

7.6.15 The 2018 surveys located two hen harrier nests within the surveyed area. Of the two hen harrier nests, one successfully fledged four chicks; the other failed (due to probable chick starvation). In 2019, a pair of hen harrier was observed displaying and mating on site in April, and breeding behaviour from this pair was recorded into May. However, no nest activity was exhibited in June and July, with the pair was no longer recorded during surveys. It is likely that the nest failed at the early chick rearing stage. No other hen harrier breeding attempts were recorded in 2019.

7.6.16 The distances between proposed infrastructure and the two confirmed hen harrier nest locations recorded during baseline surveys in 2018 are shown in **Confidential Appendix 7.2**.

7.6.17 In 2018 a merlin nest was located in the surveyed area. This nest was successful, fledging three chicks. A pair of merlin was recorded on site in June 2019; however, nesting behaviour

was not exhibited and no nest was found. It is likely that the pair did not nest on site or had a breeding attempt that failed early in the season.

7.6.18 The distances between proposed infrastructure and the 2018 merlin nest location are shown in **Confidential Appendix 7.2**.

7.6.19 During the 2018 breeding season short-eared owl was recorded exhibiting typical breeding behaviour close to the edge of the previously proposed site boundary (within the site boundary as represented on **Figure 7.2**) and, thus, this species was classed as holding a territory in this area during breeding bird survey analysis (see **Confidential Appendix 7.2** for territory location). However, a nest was not located, and breeding could therefore not be confirmed. No short-eared owl activity was observed during the 2019 raptor or VP surveys.

7.6.20 Other raptor species recorded on site during the breeding season in 2018 and 2019 were buzzard (*Buteo buteo*), golden eagle, osprey, peregrine and red kite. None of these species showed evidence of breeding within the survey area, rather the records were of birds using the site for foraging and commuting.

Black Grouse Surveys

7.6.21 The results of the dedicated black grouse surveys are shown in **Figure 7.14** in **Confidential Appendix 7.2**. The dedicated surveys in 2018 and 2019 recorded one black grouse lek within the survey area (previously proposed site boundary plus 1.5 km buffer). The lek was in the same location in both years. A maximum of three males at once were recorded in April and May 2018 and one female was also recorded at the lek in April 2018. In 2019, three males were recorded at the lek in April but no activity was observed during the second visit in May.

Collision Risk Modelling

7.6.22 CRM was carried out using data collected from all VPs between March 2018 and August 2019 inclusive. The full CRM calculations are presented in **Appendix 7.1**.

7.6.23 Estimated numbers of collisions per season for target species for which CRM was conducted are presented in **Table 7.13** (avoidance factors of 98 %, 99 %, 99.5 % and 99.8 % are presented). The results in bold indicate the NatureScot recommended avoidance rate (SNH, 2017b) for each species.

Table 7.13: Estimated Number of Collisions by Season

Species	Model Type	Season	Estimated mortality assuming avoidance rate of:			
			98 %	99 %	99.5 %	99.8 %
Greylag goose	Commuting	Breeding	7.66	3.83	1.92	**0.77**
		Non-breeding	3.69	1.84	0.92	**0.37**
		Annual	11.35	5.67	2.84	**1.14**
Pink-footed goose	Commuting	Breeding	3.54	1.77	0.89	**0.35**
		Non-breeding	8.72	4.36	2.18	**0.87**
		Annual	12.26	6.13	3.07	**1.22**
Whooper swan	Commuting	Breeding	0.00	0.00	**0.00**	0.00
		Non-breeding	1.46	0.73	**0.36**	0.15
		Annual	1.46	0.73	**0.36**	0.15
Curlew	Non-directional	Breeding	**0.12**	0.06	0.03	0.01
		Non-breeding	**0.00**	0.00	0.00	0.00
		Annual	**0.12**	0.06	0.03	0.01

Species	Model Type	Season	Estimated mortality assuming avoidance rate of:			
			98 %	99 %	99.5 %	99.8 %
Hen harrier	Non-directional	Breeding	0.05	**0.03**	0.01	0.01
		Non-breeding	0.00	**0.00**	0.00	0.00
		Annual	0.05	**0.03**	0.01	0.01
Red kite	Non-directional	Breeding	0.24	**0.12**	0.06	0.02
		Non-breeding	0.00	**0.00**	0.00	0.00
		Annual	0.24	**0.12**	0.06	0.02
Merlin	Non-directional	Breeding	**0.04**	0.02	0.01	0.00
		Non-breeding	**0.00**	0.00	0.00	0.00
		Annual	**0.04**	0.02	0.01	0.00

Numbers in bold represent NatureScot recommended avoidance rates. Shaded cells represent annual estimates (the sum of the breeding and non-breeding estimates) for species with at-risk flight activity across more than one season

7.7 Potential Effects

7.7.1 This section outlines the potential impacts during the construction, operation and decommissioning phases of the Proposed Development on birds, prior to the implementation of any further mitigation.

7.7.2 It is widely accepted that wind turbines present three main areas of potential risk to birds (Drewitt and Langston, 2006):

- Direct habitat loss resulting from the construction and operation of a wind farm and associated infrastructure.
- Displacement of birds from wind farms due to disturbance during the construction and operational phases; this may be temporary or permanent. Displacement can include barrier effects in which birds alter their migration flyways or local flight paths to avoid a wind farm.
- Death due to collision (or interaction) with rotating turbine blades, towers, overhead wires, guy lines and fencing. Collision risk depends on a range of factors related to the species, numbers and behaviour of birds, weather conditions and topography and the nature of the wind farm itself. However, is generally considered to be of particular relevance for sites located in areas known to support raptors or large concentrations of wildfowl.

7.7.3 In addition to effects which are directly related to the Proposed Development, there may be other impacts which arise as a result of the combined effects of multiple wind farms (or other developments) within the local or regional area. These cumulative impacts may also result in effects, which individually would not be significant, becoming more important and significant in context.

7.7.4 Each of these potential effects is discussed in turn below for each phase of the Proposed Development (construction, operation and decommissioning) and are considered within this assessment (**Section 7.8**).

Potential effects during construction

Habitat loss

7.7.5 Construction of turbine bases, access tracks and other structures will lead to direct habitat loss and without adequate mitigation, could also result in destruction or damage to nests, eggs and/or chicks. The effects of habitat loss will depend upon the extent of land-take and the type of habitat affected. Under the WCA 1981 (as amended), it is an offence to kill or injure any

wild bird, or to damage or destroy nests and eggs; embedded mitigation measures will be put in place to prevent damage to or destruction of nests, as discussed below in this section.

Disturbance and displacement

7.7.6 The construction phase the Proposed Development could have potential impacts of associated noise and visual disturbance and if unmitigated could lead to the temporary displacement or disturbance of breeding and foraging birds. The magnitude of the 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.

7.7.7 Potential impacts are likely to be greatest during the breeding season (predominantly between March and August, depending on the species under consideration); behavioural sensitivity to the effects will vary between species.

7.7.8 Disturbance of birds due to construction activities of this type have not been sufficiently quantified and the available information is often contradictory. However, it is likely that construction impacts will be greater on species that are intolerant of noise and other sources of disturbance. Larger bird species, those higher up the food chain or those that feed in flocks in the open tend to be more vulnerable to disturbance than small birds living in structurally complex or closed habitats such as woodland (Hill *et al.*, 1997).

7.7.9 The impacts associated with construction activities are only likely to occur for as long as the construction phase continues. They are thus short-term and can be readily mitigated by avoiding sensitive areas (through the implementation of appropriately defined buffer zones), and by timing construction activities to avoid periods when sensitive species are present (if and where possible), such as the breeding season. The exception to this would be if an adverse effect on the breeding success of a feature were such that the local population becomes extinct and replacement through recruitment or re-colonisation does not occur.

Potential effects during operation

Disturbance and displacement

7.7.10 The operation of turbines and associated human activities for maintenance purposes have the potential to cause disturbance and displace birds. Disturbance impacts during the operational phase may be less than during the construction phase, as species may become habituated to turbines and disturbance due to human activities will be considerably reduced. The Proposed Development is proposed to have a lifespan of 35 years.

7.7.11 Studies have shown that, in general, species are not disturbed beyond 500 to 800 m from turbines (Hötker *et al.*, 2006; Pearce-Higgins *et al.*, 2009) and in some cases, birds do not appear to have been disturbed at all (Devereux *et al.*, 2008; Whitfield *et al.*, 2010; Douglas *et al.*, 2011; Fielding and Haworth, 2013). However, this may depend on the sensitivity of the species in question; specific disturbance impacts are discussed in the feature assessment below.

7.7.12 There is less consensus of opinion about disturbance impacts closer to wind farm infrastructure. Several studies have examined this in detail, and these are summarised below.

7.7.13 Pearce-Higgins *et al.* (2009), found evidence of lower frequencies of occurrence of some species within the vicinity of wind turbines during the breeding season, with a significant reduction in frequency of occurrence, compared to control sites, in seven of the 12 species studied. The authors extrapolated these findings to predict a percentage reduction in breeding densities within 500 m of turbines and found that seven of the 12 species showed a significantly lower frequency of occurrence: buzzard, hen harrier, golden plover, snipe, curlew, meadow pipit and wheatear (*Oenanthe oenanthe*), while there was no significant effect of wind

farm proximity on kestrel (*Falco tinnunculus*), red grouse, lapwing, skylark and stonechat distribution. Another study of displacement impacts of wind farms on 10 species of upland breeding birds by the same lead author found evidence for population declines in red grouse, snipe and curlew associated with wind farm construction, but little evidence for consistent post-construction population declines in any species (Pearce-Higgins *et al.*, 2012). However, a further study by Sansom *et al*. (2016) reported no displacement of golden plover during wind farm construction, but a significant reduction in abundance during the operational phase. Previous studies of golden plover (Douglas *et al.*, 2011) and curlew (Whitfield *et al*., 2010), involving long-term monitoring found no evidence of displacement due to wind farm infrastructure in either species. In addition, a synthesis of European work found no statistically significant adverse effect on breeding population density of any bird species, including several species found within the site such as skylark and meadow pipit (Drewitt and Langston, 2006).

7.7.14 In terms of non-breeding population densities, Hötker *et al*. (2006) reported a significantly adverse effect on geese (several species combined), golden plover and lapwing and a significantly positive effect on starling (*Sturnus vulgaris*), although the distances involved were relatively limited (mean distances were between 30 m for starling and 373 m for geese). In their study of the effects of wind turbines on the distribution of wintering farmland birds, Devereux *et al*. (2008) found no effect on four species groups (seed-eaters, corvids, gamebirds and skylarks); the only exception was pheasant (*Phasianus colchicus*).

7.7.15 Therefore, it is clear that potential disturbance and displacement impacts associated with wind farm construction and operation vary between species, sites, years and seasons and should be considered on a case-by-case basis.

7.7.16 Individual turbines, or a wind farm as a whole, may present a barrier to the movement of birds, restricting or displacing birds from much larger areas. The effect this would have on a population is subtle and difficult to predict with any degree of certainty. If birds regularly have to fly over or around obstacles or are forced into suboptimal habitats, this may result in reduced feeding efficiency and greater energy expenditure. By implication, this will reduce the efficiency with which they accumulate reserves, potentially affecting breeding success or survival.

Collision with turbines

7.7.17 Collision of a bird with turbine rotors or towers is almost certain to result in the death of the bird. In low density populations (e.g., raptors) this could have a more adverse effect on the local population than in higher density populations (e.g., skylark), because a higher proportion of the local population would be affected in a low-density population. The frequency and likelihood of a collision occurring depends on a number of factors. These include aspects of the size and behaviour of the bird (including their use of a development site), the nature of the surrounding environment, and the structure and layout of the turbines.

7.7.18 Collision risk is perceived to be higher for birds that spend much of the time in the air, such as foraging raptors and those that have regular flight paths between feeding and breeding/roosting grounds (e.g., geese). The risk of bird collisions at wind farms is greatest in areas where large concentrations of birds are present (such as on major migration routes), and in poor flying conditions, such as rain, fog, strong winds that affect birds' ability to control flight manoeuvres, or on dark nights when visibility is reduced (Langston and Pullan, 2003; Drewitt and Langston, 2006). Birds may also be more susceptible if the wind farm is located in an area of high prey density.

7.7.19 It should be noted that operational disturbance and collision risk impacts are mutually exclusive in a spatial sense; i.e., a bird that avoids the wind farm area due to disturbance cannot be at risk of collision with the turbine rotors at the same time. However, they are not

mutually exclusive in a temporal sense; i.e., a bird may initially avoid the wind farm but habituate to it and would then be at risk of collision.

7.7.20 Passerines nesting within a wind farm site would be expected to be regularly flying between turbines and could therefore be expected to be most at risk of collision. However, passerines tend to fly below PCH and evidence suggests that passerines collide with turbines too infrequently for there to be a significant effect of collision at the population level. Moreover, most of the species concerned are of low or negligible conservation value.

Potential effects during decommissioning

7.7.21 Turbine removal may cause disturbance to birds breeding, foraging or roosting within the site. The level of impact will depend on the bird species present at the time of decommissioning and cannot be reliably predicted at this stage. However, as decommissioning activities are of a similar type and intensity as construction activities, the assessment considers that the potential effects of decommissioning will be similar in nature to the potential effects of construction, with the exception that habitat is likely to be restored and displaced birds will be able to return to abandoned territories. These are therefore not discussed separately within the assessment in **Section 7.8**.

Embedded mitigation

7.7.22 Embedded mitigation is built into the Proposed Development to avoid or reduce any significant adverse effects associated with the Proposed Development, and to ensure compliance with the WCA (1981) as amended, as well as potentially providing positive effects in the longer term. Various mitigation measures have already been and will continue to be implemented to provide compliance with legislation, and to follow good practice guidance and consultation recommendations with regard to breeding birds. Where experience of developing projects of this nature has shown that embedded mitigation is sufficient to prevent significant adverse impacts on IOFs, this has been built into the assessment in order to produce an EcIA which is proportionate to the risks posed by the Proposed Development. These embedded mitigation measures are outlined below.

7.7.23 The Proposed Development has undergone several design iterations to minimise potential environmental impacts (see **Chapter 2: Site Selection and Design** for further details). Consequently, ornithological constraints have been considered during the scheme evolution, and areas with e.g., the highest densities of breeding waders have been avoided for turbine placement. Potential effects are assessed against this final design.

Construction phase

7.7.24 All relevant construction phase embedded mitigation measures, such as appointment of an Environmental Clerk of Works (ECoW), will be implemented through a Construction Environmental Management Plan (CEMP), which will be agreed with the Highland Council (THC) in consultation with NatureScot and Scottish Environment Protection Agency (SEPA). An outline CEMP is provided in **Appendix 3.1.**

Environmental Clerk of Works

7.7.25 In line with good practice, an independent ECoW will be appointed prior to the commencement of construction and will be present on site during enabling works and throughout the construction phase. 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.

7.7.26 Prior to the start of construction/the bird breeding season, contractors will be made aware of the ornithological sensitivities within the site (particularly with regard to the potential presence of *Schedule 1* 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.

7.7.27 The ECoW will carry out pre-construction survey checks during the bird breeding season (March to August, inclusive) in advance of vegetation stripping or excavation works to check for the presence of any breeding birds. Any active nests found will be cordoned off to a suitable distance for the species concerned (in line with appropriate guidance) 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 appropriate planning condition.

Legal compliance regarding breeding birds

7.7.28 Under the WCA (1981) as amended it is an offence, with only limited exceptions, to:

- Intentionally or recklessly take, interfere with, damage or destroy the nest of any wild bird whilst it is in use or being built (applies year-round for nests of birds included in Schedule 1A);
- Obstruct or prevent any wild bird from using its nest;
- Intentionally or recklessly take, interfere with or destroy the egg of any wild bird;
- Intentionally or recklessly disturb any wild bird listed on *Schedule 1* while it is nest building, or at (or near) a nest containing eggs or young, or disturb the dependent young of such a bird;
- Intentionally or recklessly harass any wild bird included in *Schedule 1A*; or
- Knowingly cause or permit any of the above acts.

7.7.29 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.

Species Protection Plan

7.7.30 A SPP will be produced; this plan will detail specific embedded mitigation measures required prior to and during the construction phase for protected bird species potentially breeding at the Proposed Development, including *Schedule 1* raptors, black grouse and upland waders, particularly in the vicinity of historic nest sites or suitable nesting habitat. It is proposed that this will be secured through planning condition. Surveys for breeding *Schedule 1* raptors will be undertaken prior to the construction phase in areas of suitable habitat within 1 km of the Proposed Development, following Hardey *et al.* (2013). Should breeding *Schedule 1* raptors be identified during pre-construction surveys, a suitable species-specific exclusion zone around the breeding site will be installed following guidance (Ruddock and Whitfield, 2007). The effectiveness of this exclusion zone will be monitored by the ECoW and be reduced/increased if deemed appropriate.

7.7.31 Measures to prevent disturbance to lekking black grouse would be included in the SPP and will be overseen during construction by the ECoW. All areas of suitable habitat within 750 m of construction works will be monitored for lekking activity prior to and during any construction during the lekking period (mid-March to mid-May). If lekking behaviour is recorded within 750 m of construction then restrictions on timing of construction works within an appropriate exclusion zone will be implemented based on Ruddock and Whitfield (2007). The ECoW will undertake a watching brief to monitor for signs of disturbance. Restrictions on construction times and locations may then be adjusted as appropriate based on the results of this

monitoring. Black grouse nests will be protected through nest checks within 150 m of construction works, as described in **Paragraph 7.7.27**.

7.7.32 The SPP will also include measures required to minimise the risks of black grouse collision with any fencing. This will involve minimising fencing used for the Proposed Development as far as possible and marking essential fencing to make them more visible to black grouse.

Operational phase

7.7.33 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 phase.

Decommissioning

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

7.8 Features Brought Forward for Assessment

7.8.1 The baseline survey results outlined in **Section 7.6** were used to inform the identification of ornithological features of relevance to the Proposed Development and have been assigned assessment values in **Table 7.14** below. Regional population and Scottish context estimates are given in the context of NHZ 10 and/or Highland or Nairn, where relevant. The Proposed Development lies in the Highland area in the context of Scottish Ornithologists' Club (SOC) bird recording. Due to its large area, Highland has been divided into smaller areas for Scottish Raptor Monitoring Scheme (SRMS) monitoring to reflect a combination of old counties (e.g., Inverness-shire) and Highland Council wards (e.g., Nairn, Badenoch & Strathspey). In the context of SRMS references, the Proposed Development is located in the Nairn area. Therefore the local context for raptor species has been given for Highland and Nairn.

7.8.2 **Table 7.15** shows the determination of designated ornithological sites within 25 km of the Proposed Development as IOFs. These have been included for completeness but shall be dealt with in the Screening for HRA (refer to **Appendix 7.3**).

Table 7.14: Determination of Important Ornithological Features (IOFs) Occurring at the Proposed Development

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
Greylag goose	Amber	Regional	UK*: 47,000 pairs in the breeding season UK*: 230,000 wintering individuals No NHZ estimate	The species is a common resident in Scotland with a naturalised, probably re-established population in the area of the Proposed Development. After the breeding season, native populations are joined by immigrants from Iceland that winter in lowland areas.	There were 91 flights (430 individuals) of greylag goose recorded during the VP surveys (82 flights during the breeding seasons). Predicted collision mortality for greylag goose is 0.77 birds per summer and 0.37 during the winter. Up to three breeding territories were estimated within the site in 2018.	Yes	This species is of regional value as there may be some connectivity between birds recorded in the non-breeding season with the Moray & Nairn Coast SPA, though the number of records was relatively low at this time. This reflects that the site is outwith the core foraging range of the SPA (15-20 km). Greylag goose is a target species of medium conservation concern (species on the UK BoCC Amber List). The predicted collision mortality for greylag goose is 1.14 birds annually. Three pairs bred on site. Given the potential risk of collision and disturbance/displacement greylag goose is considered to be an IOF.
Pink-footed goose	Amber	Regional	UK*: 510,000 wintering individuals NHZ 10†: 7 wintering individuals NHZ 16†: (Eastern Lowlands) 162,039	Pink-footed goose is an abundant winter visitor and Scotland is a key wintering area for birds breeding in Iceland and Greenland. Large feeding and roosting flocks are present in eastern and central Scotland, especially in autumn and	There were 18 flights (838 individuals) recorded during 18 months of VP survey work (14 flights during the breeding seasons 2018 and 2019). Predicted collision mortality for pink-footed goose is 0.87	Yes	This species is of regional value as there may be some connectivity between birds passing over the site with the Moray & Nairn Coast SPA; although the number of birds recorded is not considered crucial to site integrity. This reflects that the site is outwith the core foraging range of the SPA (15-20 km). Pink-footed goose is a target species of medium

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
			wintering individuals	early winter. Occasional breeding has occurred in the eastern Highlands by feral birds (Forrester *et al.*, 2007).	birds per wintering season and 1.22 birds annually.		conservation concern (species on the UK BoCC Amber List). The predicted collision mortality for pink-footed goose is 1.22 birds annually. Due to this potential collision risk, pink-footed goose is considered to be an IOF.
Whooper swan	Sch 1.1, Ann I, SBL, Amber	Regional	UK*: 28 pairs in the breeding season UK*: 19,500 wintering individuals NHZ 10†: 28 wintering individuals NHZ 16†: (Eastern Lowlands) 1,524 wintering individuals	Whooper swan is a common winter visitor and very rare breeder in Scotland. Wintering birds are from the Icelandic breeding population. In Highland, some local breeding events by feral birds have occurred. Whooper swan is mainly found in the east of Scotland as a common migrant and winter visitor (Forrester *et al.*, 2007) and birds recorded passing over the site are probably better regarded in a national context rather than as birds of NHZ 10.	There were six flights (62 individuals) recorded during the VP surveys in the non-breeding season 2018/19 of which four (29 individuals) were at PCH. Predicted collision mortality for whooper swan is 0.36 birds per winter.	Yes	This species is of regional value as it is a target species of medium conservation concern (species on the UK BoCC Amber List) that is present in regionally important numbers. It is a qualifying non-breeding feature of the Moray and Nairn Coast and Inner Moray Firth SPAs but the Proposed Development is outwith the 15 – 20 km core foraging range for wintering birds from these SPAs. The predicted collision mortality for whooper swan is 0.36 birds annually. Due to this potential collision risk, whooper swan is considered to be an IOF.

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
Capercaillie	Sch 1.1, Ann I, SBL, LBAP, Red	Inter-national	UK*: 1,100 wintering individuals Scotland: 1,285 individuals (Ewing *et al.* 2012) No NHZ estimate	Capercaillie is a fairly widespread but sparse resident in the Central Highlands and Cairngorm area. The current population is derived from reintroduction following extinction of the native population. In the Highlands, capercaillie are restricted to coniferous forests, mainly in Badenoch & Strathspey, and are classed as scarce and declining elsewhere. In 2019 the number of lekking males in Strathspey made up 83 % of all capercaillie in Scotland (Forrester *et al.*, 2007).	No capercaillie sightings or signs were recorded during baseline surveys.	No	No capercaillie leks, territories, individuals or signs were recorded during 18 months of ornithological survey at the Proposed Development. Furthermore, there is no suitable capercaillie habitat within the site or the recommended (SNH, 2017a) 1.5 km survey buffer. The closest known record to the site, returned by the data search, was a male recorded 2.5 km from the site boundary near Darnaway and Lethen Forest in 2014. The closest lek was 3 km from the site boundary in Darnaway and Lethen Forest, last recorded in 2017. This means that there are no disturbance or displacement effects predicted for capercaillie. As capercaillie were not recorded during VP surveys the collision risk to this species is assessed as negligible. Significant effects to capercaillie from the Proposed Development are therefore considered unlikely and not significant and this species is not considered to be an IOF. However, the Proposed Development is located between two core capercaillie areas: Strathspey and

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
							Darnaway and Lethen Forest. Therefore, the Proposed Development could potentially impact on birds dispersing between these areas or create a barrier to movement. Further consideration regarding barrier effects on designated sites with capercaillie as a designated feature are given as part of the HRA undertaken for the Proposed Development.
Black grouse	Red, SBL, LBAP	Regional	UK*: 4,850 males (breeding season) Scotland: 3,344 displaying males NHZ 10†: 114 displaying males	Black grouse is a widespread resident in many of Scotland's upland areas. Two thirds of the UK birds are now found in Scotland and here numbers declined by 29 % between 1995/96 and 2005 (Sim *et al.*, 2008). Trends varied between regions with stability in the Scottish Highlands (parts of North-east Scotland and Badenoch & Strathspey). Scottish population size is estimated at 3,550-5,750 lekking males of which 770 were estimated to be in north Scotland. The	One lekking site was recorded outwith the site boundary and over 1 km from infrastructure. During baseline surveys a maximum count of three male black grouse were recorded at a lek in 2018 and 2019. No flights were recorded during VP surveys.	No	This species is of regional value as it is a species of high conservation concern (species listed on SBL and Highland LBAP and on the UK BoCC Red List), but is not a qualifying feature of any designated sites in 10 km of the site and no black grouse leks, nests or individuals were recorded within the site (one lek within 1.5 km buffer of site boundary). The lek was recorded in both 2018 and 2019 in the same general area and with three males in attendance in both years (2.6 % of the NHZ population estimate). The recorded leks were over 750 m from all proposed infrastructure (recommended working distance for black grouse leks (Ruddock and Whitfield, 2007)). Disturbance to lekking and nesting black grouse will

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
				wintering population size in Scotland is 7,500-19,000.			be minimised by embedded mitigation (see **Section 7.7. Potential Effects**). Following embedded mitigation, a significant effect on the local population is unlikely; thus, this species is not considered to be an IOF in the context of the Proposed Development.
Golden eagle	Sch 1.1, Ann I, SBL, LBAP	Regional	UK*: 510 breeding pairs NHZ† 10: 12 occupied breeding territories	Golden eagle is a scarce resident breeding species confined largely to the uplands of the north Highlands. Scotland holds almost all of Britain's breeding birds, three quarter of them on the west coast mainland and islands. In 2019, Scottish raptor workers located 266 territories occupied by pairs (with total Scottish population estimated at 508 pairs), of which 114 were located in the Highlands and one in Nairn (Challis *et al.*, 2020).	There were seven flights/individuals recorded during the VP surveys in the breeding season 2018. All records referred to an immature bird and it is possible that they all related to the same individual. No breeding activity was recorded. Of the seven golden eagle flights recorded during 2018 breeding season VPs, two were through the CRZ at PCH giving a predicted collision mortality of 0.02 birds per breeding season.	Yes	This species is of regional value as a target species that is afforded special protection (Schedule 1, Annex I, SBL and LBAP species) but is not a qualifying feature of any statutory sites within 10 km of the Proposed Development, and it was recorded infrequently and in low numbers during baseline surveys. The Proposed Development is not within the core range (6 km) of any nests recorded by HRSG. However, due to the site being utilised by non-breeding birds(s) that could be recruited into the very small NHZ 10 breeding population (estimate of 12 breeding pairs), golden eagle is regarded as an IOF.

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
Hen harrier	Sch 1.1, Ann I, SBL, LBAP, Red	Regional	UK*: 545 pairs in the breeding season NHZ 10†: 18 breeding pairs	Hen harrier is a widespread but generally a scarce breeding species, found mostly in upland areas. Some birds move to lower altitudes or south in winter. Persecution of this species across Scotland is well documented and remains severe in certain areas. The fourth national survey of hen harrier in Scotland in 2010 recorded 505 territorial pairs (Hayhow *et al.*, 2013). In 2019, Scottish raptor workers located 228 territories occupied by pairs (with total Scottish population estimated at 460 pairs), of which 29 were located in the Highlands and none in Nairn (Challis *et al.* 2020).	This species bred within the site boundary with two nests recorded in 2018 (one successfully fledged four chicks) and one nest in 2019 (failed). There were 28 flights/individuals recorded during the VP surveys (three flights during the non-breeding seasons 2018/2019). CRM has predicted a collision mortality for this species of 0.03 birds annually.	Yes	This species is of regional value as it is a target species that is afforded special protection (Schedule 1, Annex I, SBL and LBAP species, species on the UK BoCC Red List). It is present within the site in regionally important numbers but is not a qualifying feature of any statutory sites within 10 km of the survey area. Hen harrier nests were recorded during baseline raptor surveys and flights were recorded during VP surveys. There is therefore potential for both disturbance/displacement and collision impacts. Hen harriers are therefore considered to be an IOF in the context of the Proposed Development.
Merlin	Sch 1.1, Ann I, SBL, LBAP, Red	Regional	UK*: 1,150 breeding pairs	Merlin is a scarce resident breeder on upland heather moors, and a passage and winter	There were ten flights (13 individuals) recorded during breeding season VP	Yes	This species is of regional value as it is a target species that is afforded special protection (Schedule 1, Annex I, SBL and LBAP species, species on the UK

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
			NHZ 10†: 13 breeding pairs	visitor mainly to coastal and low-lying areas. In Scotland this species occurs widely, and they are common in the Highlands and North-East Scotland, scarce in winter. In 2019, Scottish raptor workers located 161 territories occupied by pairs (with total Scottish population estimated at 733 pairs), of which 32 were in the Highlands (three in Nairn) (Challis *et al.*, 2020).	surveys in 2018 and 2019. Predicted collision mortality for merlin is 0.04 birds per breeding season. One merlin nest within the site boundary successfully fledged three chicks in 2018. No nest was found in 2019, suggesting no breeding or an early breeding attempt failure.		BoCC Red List). Collision risk is predicted for merlin as well as impact to breeding merlin during construction or operation of the Proposed Development. As such, merlin is considered to be an IOF in the context of the Proposed Development.
Peregrine	Sch 1.1, Ann I, SBL, LBAP	Local	UK*: 1,750 breeding pairs NHZ 10†: 7 breeding pairs	Peregrine is a scarce, though widespread, resident breeder and winter visitor in Scotland, mostly found in open, upland habitats but also in lowlands and cities. Some birds move locally outside the breeding season. Although numbers, distribution and breeding performance of the UK peregrine population have all	There were five flights/individuals recorded during the VP surveys (two flights during the non-breeding seasons 2018/2019). No flights were recorded during the 2019 breeding season VP surveys. No CRM was carried out for peregrine due to only one flight in the CRZ in each season.	No	This species is of local value as a target species that is afforded special protection (Schedule 1, Annex I, SBL and LBAP species) but that was recorded only occasionally and in small numbers. It is not a qualifying feature of any statutory sites within 10 km of the Proposed Development. No evidence was found of peregrine using the site or the surrounding area to breed meaning that the Proposed Development would have only low adverse disturbance and displacement effects on this species. CRM criteria

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
				largely recovered from declines caused by the detrimental effects of organochlorine pesticides in the 1950s and 1960s (Eaton et al., 2015), populations and breeding performance have since declined in northwest Scotland and the Northern Isles (Crick and Ratcliffe, 1995). In 2019, Scottish raptor workers located 260 territories occupied by pairs (with total Scottish population estimated at 523 pairs), of which 22 were located in the Highlands (none in Nairn) (Challis *et al.*, 2020).	There was no evidence of breeding within the site or the surrounding buffer.		were not met and the collision risk for this species is considered to be negligible. As disturbance, displacement and collision effects on peregrine are all considered to be negligible or low adverse and not significant, it is not considered to be an IOF.
Red kite	Sch 1.1, Ann I, SBL, LBAP	Regional	UK*: 4,400 pairs in the breeding season NHZ 10†: 0 breeding pairs	Red kite is an uncommon resident breeding bird in Scotland. Following successful reintroduction programmes, the population remains small but is increasing (well established in eastern Scotland), with most birds	There were 17 flights (18 individuals) recorded during VP surveys in years 2018-2019 (one flight during the non-breeding season). Predicted collision mortality for red kite is	Yes	This species is of regional value as a target species that is afforded special protection (Schedule 1, Annex I, SBL and LBAP species) and is present in regionally important numbers. It is not a qualifying feature of any statutory sites within 10 km of the Proposed Development.

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
			NHZ 7†: nine breeding pairs NHZ: 21†: 50 breeding pairs NHZ 12†: seven breeding pairs	remaining close to their natal areas throughout the year. The sedentary Scottish population forms communal winter roosts at a variety of traditional sites from September to March. In 2019, Scottish raptor workers located 261 territories occupied by pairs (with total Scottish population estimated at ≥ 273 pairs), of which 42 were located in the Highlands, none in Nairn but nine in the neighbouring Inverness-shire area and one in Badenoch and Strathspey (Challis *et al.*, 2020).	0.12 birds per breeding season. There was no evidence of breeding within the site.		The area within and surrounding the site boundary does not contain suitable breeding habitat for red kite and thus disturbance and displacement effects from the construction and operation of the Proposed Development are considered to be low adverse. However, given the level of flight activity recorded during baseline surveys and predicted mortality rates due to collision at the Proposed Development for this species, red kite is considered to be an IOF.
Short-eared owl	Ann I, SBL, Amber	Regional	UK*: 620 – 2,200 breeding pairs Scotland: 125 – 1,250 breeding pairs	Short-eared owl is a restricted resident breeder in Scotland, with birds moving between breeding and wintering areas. Many Scottish birds move south to winter in England, making the species a scarce migrant and winter visitor.	There were nine flights (nine individuals) recorded during VP surveys during the 2018 breeding season; however, no flights were within the CRZ. CRM was therefore not conducted for this	Yes	This species is of regional value as a target species that is afforded special protection (Annex I, SBL species, and species on the UK BoCC Amber List) and that is present in regionally important numbers. It is not a qualifying feature of any statutory sites within 10 km of the Proposed Development. Flight activity was low, with no flights recorded within the CRZ at PCH,

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
			NHZ 10†: 0 breeding pairs (low confidence)	In 2019, Scottish raptor workers located 25 pairs, of which one was located in the Highlands, in Caithness (Challis *et al.*, 2020). However, this species is under-recorded and population estimates and distribution maps have low confidence.	species. One breeding territory was estimated within the site in 2018.		however flight activity of crepuscular species may be under-recorded. During the 2018 breeding season, one short-eared owl territory was recorded in the site, approximately 360 m from proposed infrastructure and it is considered likely that nesting occurred. No short-eared owl activity was observed during surveys undertaken in 2019. However, the probable nest recorded in 2018 shows that short-eared owl could be at potential disturbance/displacement by the Proposed Development. Therefore, short-eared owl is considered to be an IOF.
Common sandpiper	Amber	Local	UK*: 13,000 breeding pairs; 52 wintering individuals Scotland (outdated numbers): 17,000-24,000 breeding pairs	This species is a widely distributed breeding bird across upland Scotland. It is also common and widespread as a spring and autumn passage migrant, with very small numbers overwintering. A 24 % decline in the Scottish breeding population has been recorded between 1995 and 2018 (Sim *et al.*, 2008). In the Highlands,	Up to two breeding territories were estimated within the survey area (one outwith the site boundary) in 2018.	No	This species is of local value. It is a common and widespread species but is of medium conservation concern (species on the UK BoCC Amber List). This species is closely associated with freshwater margins and in the survey area the common sandpiper territories were found along the Leonach Burn. Proposed infrastructure is located outwith the 150-300 m disturbance buffer from the Leonach Burn. Furthermore, there is an abundance of suitable nesting habitat away from the

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
			No NHZ estimate	common sandpiper is a common breeder but absent in winter.			Proposed Development. Therefore, effects of displacement or disturbance due to construction and operation of the Proposed Development are unlikely to be significant to the common sandpiper population. As such, this species is not considered to be an IOF.
Curlew	SBL, LBAP, Red	Regional	UK*: 58,500 breeding pairs UK*: 125,000 wintering individuals 85,700 wintering individuals NHZ 10†: 811 breeding pairs	Curlew is a widespread resident in Scotland breeding on farmland and uplands and a common passage and winter visitor to coasts and nearby fields. Recent records for Scotland indicate a 59 % decline in breeding birds between 1995 and 2018 (Harris *et al.*, 2020). In the Highlands curlew is a common but declining breeder and common winter visitor in the Inner Moray Firth but uncommon elsewhere.	There were 62 flights (69 individuals) recorded during breeding season VP surveys in 2018 and 2019. Predicted collision mortality for curlew is 0.12 birds per breeding season. Up to 14 breeding territories were estimated within the survey area (one outwith the site boundary) in 2018.	Yes	This species is of regional value. It is a target species of high conservation concern (SBL and LBAP species and species on the UK BoCC Red List) and is present in regionally important numbers (territories make up 1.7 % of the NHZ population) but is not a qualifying feature of any statutory sites within 10 km of the Proposed Development. Given the relative abundance of breeding birds within the site boundary and moderate flight activity recorded during baseline surveys, this species is considered to be an IOF.
Golden plover	Ann I, SBL, LBAP	Local	UK*: 32,500 – 50,500 breeding pairs	This species is a widespread breeding bird in the Scottish uplands, particularly in the Highlands and Islands.	There were eight flights (ten individuals) recorded during VP surveys in 2018-2019 (one flight during the	Yes	This species is of local value. It is a target species of high conservation concern (Annex I, SBL and LBAP species) but is present in only locally important numbers (territories make up

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
			UK*: 410,000 wintering individuals Scotland: 15,000 breeding pairs; 25,000 – 35,000 wintering birds NHZ 10†: 2,702 breeding pairs	Numbers of golden plover in Scotland have experienced mixed fortunes in recent decades with significant declines in southern Scotland and significant increases in north-west Scotland and the Outer Hebrides (Sim *et al.*, 2005). The recent long-term data from Scotland show that the Scottish breeding population of golden plover is steady although slightly declining (by 7 % between 1995 and 2018 (Harris *et al.*, 2020)). In the Highlands golden plover is a locally common breeder and locally common migrant and uncommon winter visitor, mainly in the east.	non-breeding season). The location of flights and flight heights meant that only one flight was recorded in the CRZ at PCH and so CRM was not undertaken. Up to ten golden plover territories were estimated within the survey area (two outwith the site boundary) in 2018.		0.4 % of the NHZ population) and is not a qualifying feature of any statutory sites within 10 km of the Proposed Development. No CRM was undertaken for golden plover; however, up to ten territories were recorded during baseline surveys. As golden plover are known to be displaced by operational turbines by up to 400 m (Sansom *et al.*, 2016), displacement may occur during construction or operation of the Proposed Development. As golden plover are of high conservation value (listed on Annex 1 of the Bird's Directive) and there is potential for breeding birds to be disturbed by the Proposed Development it is considered to be an IOF.
Snipe	LBAP, Amber	Local	UK*: 66,500 breeding pairs; 1,100,000 wintering individuals	This species is a fairly common, widespread breeding species; in winter birds move south and to lower elevations, and Scottish birds are	No snipe flights were recorded during VP surveys. Up to nine territories were estimated within the survey area (three	No	This species is of local value as it is a target species of medium conservation concern (LBAP species and a species on the UK BoCC Amber List) that is present in locally important numbers

Species	Conservation designation*	Value	Population estimate	Scottish context	Baseline	IOF	Justification
			Scotland: 34,000-40,000 breeding pairs; 10,000-30,000 wintering individuals NHZ 10†: 690 breeding pairs	joined by migrants from Scandinavia and northern Europe. Breeding occurs in most areas except the most heavily farmed land. A 22 % increase in the Scottish breeding population was recorded between 1995 and 2018 (Harris *et al.*, 2020). In the Highlands snipe is a common breeder, locally common migrant and winter visitor.	outwith the site boundary) in 2018.		and is not a qualifying feature of any statutory sites within 10 km of the site. No flight activity was recorded, however up to nine territories were estimated during baseline surveys, Given the size of the breeding population in NHZ 10 (690 pairs), any displacement would be undetectable against background annual mortality (c. 50 % (Cramp and Perrins, 1994)), therefore any impact would be negligible. Furthermore, there is extensive alternative breeding habitat within the site and in the surrounding area. Additionally, any potential disturbance to breeding birds will be minimised through embedded mitigation (see **Section 7.9).** Snipe is a common and widespread breeder throughout Scotland, therefore effects of displacement due to disturbance associated with construction and operation of the Proposed Development are unlikely to be significant to the local snipe population. As such, this species is not considered to be an IOF.

Key: Sch1.1 = Schedule 1 part 1 of the Wildlife & Countryside Act 1981 (as amended); Ann I = Annex I of the EC Birds Directive; SBL = Scottish Biodiversity List; LBAP = Highland Biodiversity Action Plan priority species; Red = UK Birds of Conservation Concern (BoCC) Red-listed species; Amber = UK BoCC Amber-listed species
**Wilson* et al. *(2015), †Woodward* et al. *(2020a)*

Table 7.15: Determination of Designated Sites within 25 km of the Proposed Development as Important Ornithological Features (IOFs)

Designated Site	Notified Features	Value	Assessed Condition	IOF	Justification
Darnaway & Lethen Forest SPA	Breeding capercaillie	International	Unfavourable no change	Yes	Darnaway and Lethen Forest SPA is 10.6 km north north-east of the Proposed Development and capercaillie is a notified feature.
Anagach Woods SPA	Breeding capercaillie	International	Unfavourable declining	Yes	Anagach Woods SPA is 11.3 km south-east of the Proposed Development and capercaillie is a notified feature.
Kinveachy Forest SPA	Breeding capercaillie	International	Favourable maintained	Yes	Kinveachy Forest SPA is 11.5 km south south-west of the Proposed Development and capercaillie is a notified feature.
Craigmore Wood SPA	Breeding capercaillie	International	Unfavourable declining	Yes	Craigmore Wood SPA 12.4 km south-east of the Proposed Development and capercaillie is a notified feature.
Abernethy Forest SPA/SSSI	Breeding capercaillie	International	Favourable maintained	Yes	Abernethy Forest SPA/SSSI is 13.0 km south south-east of the Proposed Development and capercaillie is a notified feature.
Cairngorms SPA	Breeding capercaillie	International	Favourable maintained	Yes	Cairngorms SPA is 19.3 km south of the Proposed Development and capercaillie is a notified feature.

7.8.3 The species considered to be IOFs in the context of the Proposed Development, and therefore considered further in this EcIA are:

- Greylag goose (collision, disturbance/displacement);
- Pink-footed goose (collision);
- Whooper swan (collision);
- Golden eagle (collision);
- Hen harrier (collision, disturbance/displacement);
- Merlin (collision, disturbance/displacement);
- Red kite (collision);
- Short-eared owl (disturbance/displacement);
- Curlew (collision, disturbance/displacement); and
- Golden plover (disturbance/displacement).

7.8.4 The impact assessment for each of these species is provided below.

Greylag geese

Introduction

7.8.5 Greylag goose is included on the UK BoCC Amber List due to its restricted wintering distribution (at least 50 % of birds in ten or fewer sites) (Eaton *et al.*, 2015). The species is a common resident in Scotland with a native population in the north and west (20,000 birds post-breeding) and a naturalised, expanding and probably re-established population in the south and east (5,000 birds post-breeding; at least 700 pairs) (Forrester *et al.*, 2007). After the breeding season, these birds are joined by more than 85,000 immigrants from Iceland that winter in lowland areas.

7.8.6 Greylag goose is a very common migrant winter visitor in Highland, Moray and Nairn (Bain *et al.*, 2019; Cook, 2018). In February and March 2019, flocks containing 300 or more birds were recorded around the River Dulnain (approximately 10 km south of the Proposed Development). A coordinated census in November 2019 undertaken in Speyside, between Grantown-on-Spey (approximately 12 km from the Proposed Development) and Boat of Garten recorded 1,350 wintering greylag geese. Additionally, in June 2019 a large moulting flock was recorded on Lochindorb (approximately 1.5 km from the site) that had a peak of 1,000 individuals recorded (Bain *et al.*, 2019).

Potential collision risk impact

7.8.7 During breeding season VP surveys 32 flights, totalling 77 individuals, had a period spent in the CRZ. During non-breeding season VP surveys three flights, totalling 57 individuals, had a period spent in the CRZ at PCH. Details of the collision risk assessment are provided in **Appendix 7.1**. The model shows that, assuming a 99.8 % avoidance rate as recommended by NatureScot (SNH, 2017b), a collision risk of 0.77 collisions per breeding season and 0.37 per non-breeding season are predicted (see Error! Reference source not found.).

7.8.8 The predicted breeding season mortality represents 0.002 % of the estimated Scottish breeding population (47,405 (Mitchell *et al.*, 2011)) and 0.08 % of the post-breeding moulting flock size recorded at Lochindorb in 2019. The predicted non-breeding season mortality represents less than 0.001 % of the estimated Scottish wintering population (more than 105,000) (Forrester *et al.*, 2007) and 0.03 % of the Speyside (Grantown-on-Spey to Boat of Garten) population estimate from the 2019 census (Bain *et al.*, 2019).

7.8.9 It is likely that, even if realised, the predicted collision rate would be undetectable against background annual mortality; annual mortality of greylag geese older than approximately six months old that overwinter in the UK has been estimated at 16 % (Trinder *et al.*, 2005).

7.8.10 Greylag geese were also recorded during 2018/19 non-breeding VP surveys and these flights are considered to be migrating birds, not associated with those recorded in the breeding season. The area within and surrounding the site does not offer suitable wintering habitat for greylag geese.

7.8.11 Greylag goose collisions appear to be an uncommon event, as such, the potential impact as a result of collision risk is considered to be of **negligible magnitude**, resulting in an effect which is **not significant** for greylag goose at the regional level.

Potential disturbance/displacement impacts

7.8.12 Up to three breeding territories were estimated to be within the site in 2018, but none of these locations were in close proximity to turbines (all territories were over 500 m from the proposed infrastructure). Greylag geese were recorded during VP surveys throughout the 2018 and 2019 breeding seasons, and it is therefore assumed that breeding season (March-August) flights are related to breeding birds. However, greylag geese will move their precise nesting locations between years and may not breed within the site every year. There is, however, extensive alternative suitable habitat available both within and surrounding the site in which greylag geese could breed without disturbance from the Proposed Development.

7.8.13 It is considered likely that any potential disturbance or displacement to nesting greylag geese will be confined to the construction phase and will therefore be short-term and temporary in nature. Furthermore, as part of the embedded mitigation (see **Paragraphs 7.7.25-7.7.29**), pre-works nesting bird checks will be undertaken to ensure that no bird nests (including greylag geese) are harmed or disturbed during construction. In light of this, disturbance and displacement of greylag goose during the construction phase is likely to be of a **low magnitude**, resulting in an effect which is **not significant**.

Pink-footed geese

Introduction

7.8.14 Pink-footed goose is included on the UK BoCC Amber List due to the large numbers that winter in the UK (at least 70 % of the European population) and its restricted distribution (at least 90 % of birds in ten or fewer sites) (Eaton *et al.*, 2015). This species is an abundant winter visitor, with peak numbers recorded in October before some birds continue south to England. Scotland is a key wintering area for birds breeding in Iceland and Greenland (Scotland's wintering population is 50 % of the global total); large feeding and roosting flocks are present in eastern and central Scotland, especially in autumn and early winter. As winter progresses, redistribution to other parts of the wintering range occurs. In October 2019, a total of 500,928 pink-footed geese were counted in the UK - in the Highlands 67,003 birds were counted in October and 11,340 in November 2019 (Brides *et al.*, 2020). In the eastern Highlands pink-footed goose is a common winter visitor with marked spring passage.

7.8.15 Although the Proposed Development is located in NHZ 10, the estimate for this zone (seven birds) is not considered to be relevant to the assessment, as this species was only recorded passing over the site during migration periods, so does not reflect the number of birds using NHZ 10 during the non-breeding season. Pink-footed geese migrate across northern Scotland on their way to/from areas further south, with birds congregating in areas such as central Scotland in the autumn, before the majority move on to spend the winter further south in the UK. Therefore pink-footed geese passing over the Proposed Development are considered to be best regarded in the context of the national population rather than any one NHZ. However, in order to provide a more precautionary approach to this assessment, consideration is given to both NHZ 21: Moray Firth (the likely local staging area for birds crossing the Proposed Development) and NHZ 16: Eastern Lowlands (considered to be the area in which most birds

passing over the Proposed Development are likely occur, at least temporarily, before/after crossing the site).

Potential collision risk impact

7.8.16 All flights recorded during the 18 months of VP survey work were recorded during the spring or autumn migration periods (March-May and September-November respectively). Furthermore, pink-footed goose flights were all recorded in the first half of the migration seasons (latest spring flight was mid-April; latest autumn flight was mid-October), with no records of pink-footed geese at the Proposed Development during the winter months. This suggests that the birds were migrating over the site either towards (autumn) or away from (spring) wintering grounds to the south and east.

7.8.17 Four flights, totalling 285 individuals, had a period spent in the CRZ at PCH. The collision risk model shows that, assuming a 99.8 % avoidance rate as recommended by NatureScot (SNH, 2017b), a collision risk of 1.22 collisions per year is predicted for pink-footed goose (see Error! Reference source not found.). This represents less than 0.005 % of the population estimates of NHZs 21 and 16 and of the most recent Scottish and UK wintering population estimates (see **Table 7.16**).

Table 7.16: Pink-footed geese population estimates and predicted collisions percentages

Area	Population estimate	Predicted collisions - % of population estimate
NHZ 21 (Moray Firth)	35,370*	0.003
NHZ 16 (Eastern Lowlands)	162,039*	0.0008
Scottish population	393,170†	0.0003
UK population	510,000‡	0.0002

** Wilson* et al. *(2015); †Bainbridge (2017); ‡Woodward* et al. *(2020a)*

7.8.18 Annual mortality of pink-footed geese older than approximately six months that overwinter in the UK has been estimated at 14% (Trinder *et al.*, 2005). If realised, the predicted collision rate would be undetectable against background annual mortality. The continuing increase in the UK pink-footed goose wintering population (e.g., a 120 % increase between 1988/89 and 2014/15 (Hayhow *et al.*, 2017)) should also be considered when assessing these local level population impacts. It appears that collisions of this species are relatively rare (Plonczkier and Simms, 2012), as is reflected in the current recommended avoidance rate. As such, the potential impact as a result of collision risk is considered to be of **negligible magnitude**, resulting in an effect which is **not significant** for pink-footed goose at the regional level.

7.8.19 There is no predicted habitat loss or disturbance impact on pink-footed goose as no evidence was found of this species using the site for breeding or foraging.

Whooper swan

Introduction

7.8.20 Whooper swan is included on the UK BoCC Amber List due to its restricted wintering distribution (at least 90 % of birds in ten or fewer sites) (Eaton *et al.*, 2015). The species is a common winter visitor and very rare breeder in Scotland. Long-established Scottish wintering birds are from the Icelandic breeding population. Peak numbers in Scotland occur in November. During the 2015 census, 846 birds were counted in the Highlands, with Scotland holding 11.1 % of the wintering UK population (Hall *et al.*, 2016). Whooper swan has bred in the Highlands and occasionally individuals summer there (some local breeding events appear to involve feral birds). The Insh Marshes and the marshes of the River Spey (approximately

31 km south of the Proposed Development) are regularly used by wintering whooper swan, with a peak count of 177 birds in the River Spey marshes in March 2019 (Bain, 2020).

7.8.21 Although the Proposed Development is located in NHZ 10, given that flights were recorded during migration periods, NHZ16 (Eastern Lowlands) to the south of the Proposed Development have also been considered for this species.

Potential collision risk impact

7.8.22 Three flights, totalling 24 individuals, had a period spent in the CRZ at PCH. The collision risk model shows that, assuming a 99.5 % avoidance rate as recommended by NatureScot (SNH, 2017b), a collision risk of 0.36 collisions per year is predicted (see Error! Reference source not found.). This represents less than 0.1 % of the total population estimates of NHZ 16 and of the most recent Scottish and UK wintering population estimates (see **Table 7.17**). All whooper swan flights were recorded in mid-October 2018, which suggests that the birds were migrating over the site rather than wintering in the area, meaning that the NHZ 16 and Scottish population estimates are most relevant for assessment purposes.

Table 7.17: Whooper swan population estimates and predicted collisions percentages

Area	Population	Predicted collisions - % of population
NHZ 16 (Eastern Lowlands)	1,524	0.02
Scottish population	16,000	0.002
UK population	19,500	0.002

7.8.23 Annual mortality of adult whooper swans that overwinter in the UK has been estimated at 16 % (Trinder, 2012), and as such even if actually realised, the predicted collision rate would be undetectable against background annual mortality. The continuing increase in the UK whooper swan wintering population (estimated at approximately 5 % per year (Robinson *et al.*, 2004; Trinder, 2012)) should also be considered when assessing these local level population impacts. As such, the potential effect as a result of collision risk is considered to be of **low magnitude**, resulting in an effect which is **not significant** for whooper swan at the regional level.

7.8.24 There is no predicted habitat loss or disturbance impact on whooper swan as no evidence was found of this species using the site for breeding or foraging.

Golden Eagle

Introduction

7.8.25 Golden eagle is a LBAP priority species and is included on the SBL. It is also listed on *Schedule 1A* of the *Wildlife and Countryside Act* and *Annex I* of the *EU Birds Directive*. This species is a scarce resident breeding species confined largely to the uplands of the north Highlands. Scotland holds almost all of Britain's breeding birds, three quarters of them on the west coast mainland and islands.

7.8.26 In 2019, Scottish raptor workers located 266 territories occupied by pairs (with total Scottish population estimated at 508 pairs), of which 114 were located in the Highlands and one in Nairn (Challis *et al.*, 2020).

Potential collision risk impact

7.8.27 Of the seven golden eagle flights recorded during VP surveys, two were recorded in the CRZ at PCH. CRM was conducted for this season and, assuming a 99 % avoidance rate as recommended by NatureScot (SNH, 2017b), this would result in 0.02 collisions per year. This represents less than 0.2 % of the total population estimate of NHZ 10 and less than 0.002 % of the most recent Scottish population estimate.

7.8.28 Furthermore, topographical analysis of the site and the surrounding area was undertaken using the GET model (Fielding *et al.*, 2019) (see **Figure 7.14**). It was found that 8.8 % of the land within the site scored above 6 in the model (the topography in which it was found that dispersing golden eagles were most likely to fly over). None of this area was within 275 m of proposed turbine locations (the CRZ). It is therefore considered that the Proposed Development does not pose a significant threat to dispersing golden eagles, and this is backed up by the low proportion of golden eagle flights that qualified for CRM.

7.8.29 As such, the potential impact as a result of collision risk is considered to be of **low magnitude**, resulting in an effect which is **not significant** for golden eagle at the regional level.

7.8.30 There is no predicted habitat loss or disturbance impact on golden eagle as no evidence was found of this species using the site for breeding. Habitat loss is not predicted to have an impact on golden eagle foraging. This is because of to the limited evidence of golden eagle foraging within the site, the limited amount of habitat loss from the Proposed Development and the extensive available foraging habitat available at the site and the surrounding area.

Hen harrier

Introduction

7.8.31 Hen harrier is a LBAP priority species and is included on the SBL. The species is also classed as Schedule 1 and Annex I and Red-listed due to both historical and recent population declines. In the last census in 2010, the Scottish population was estimated at 505 pairs, down from 633 in 2004, representing 76 % of the UK population (Hayhow *et al.*, 2013) and 5-9 % of the European population (Forrester *et al.*, 2007). The breeding population of north-east Scotland has been estimated at 18-22 pairs; 3 % of the Scottish population (Francis and Cook (2011). The most recent estimate for number of breeding pairs of hen harrier in the Central Highlands (NHZ 10) is 18 (Wilson *et al.* 2015). Persecution of this species across Scotland is well documented and remains severe in certain areas (Forrester *et al.*, 2007).

7.8.32 In the Highlands, hen harrier is described as an uncommon breeder, mainly in the east and scarce in winter (Forrester *et al.*, 2007). The RSPB data included one individual record of this species from within 10 km of the Proposed Development within the last ten years (see **Appendix 7.1**). In the same 10-year period, the HRSG data showed two breeding sites within 10 km of the Proposed Development, both fledging young in 2018 and unoccupied in 2019. No other breeding records were available within 10 km of the Proposed Development in other years between 2011 and 2020. These records were collected as part of the desk study and are additional to any records collected during baseline ornithological surveys for the Proposed Development.

Potential collision risk impact

7.8.33 Of the 25 flights recorded during the breeding seasons 2018 and 2019, six flights had a period spent in the CRZ at PCH. Three flights were recorded during the 2018/19 non-breeding season, none of which was at PCH or in the CRZ. CRM was carried out for the breeding season only. Assuming a 99 % avoidance rate as recommended by NatureScot (SNH, 2017b), the predicted breeding season (and therefore also annual) mortality rate associated with the Proposed Development is 0.03 individuals per year (0.1 % of the NHZ 10 population).

7.8.34 Hen-harrier collisions appear to be an uncommon event which suggests that this species is not particularly vulnerable to collision. Studies have shown that hen harriers will forage in proximity to turbines (Thelander and Rugge, 2000; Green, 1995; Bioscan, 2001), and no studies have shown any significant adverse effect. Harriers are generally most at risk of collision during the breeding season in the proximity of nest sites, while 'skydancing' (displaying), carrying out food passes or during practice flights of juveniles. When hunting,

harriers generally fly below rotor height, close to ground in order to avoid being detected by prey (McCluskie *et al.*, 2017).

7.8.35 As such, the potential impact as a result of collision risk during operation is considered to be of **low magnitude**, resulting in an effect which is **not significant** for hen harrier.

Potential disturbance/displacement impacts

7.8.36 Of the two hen harrier nests found within the site boundary in 2018, one successfully fledged four chicks and the other failed (due to chick starvation). In 2019 a pair was observed during the early breeding season but it is thought that any nesting attempt failed at an early stage. No other hen harrier breeding attempts have been recorded within the site boundary during the period of 2011 to 2020 for which HRSG data was obtained.

7.8.37 The recommended disturbance distance for this species is 750 m (Ruddock and Whitfield, 2007), and some wind farm infrastructure is located within the 750 m buffer of the hen harrier nest locations described above. The distance between proposed infrastructure and breeding sites suggests that there may be disturbance/displacement impacts associated with the construction of the Proposed Development and associated infrastructure. The impact of displacing two breeding pairs would represent a displacement of 11.1 % of the breeding NHZ 10 population. However, given that hen harriers have only chosen to nest in these locations twice over the past ten years, with embedded mitigation in place, such as pre-construction surveys (see **Paragraphs 7.7.25-7.7.32**), it is considered that the magnitude of these impacts will be **moderate** during the construction period resulting in an effect which is **not significant** at the regional level.

7.8.38 During the operational phase, it is considered unlikely that there will be any displacement effects caused by avoidance of the operational turbines. Displacement studies have concluded that foraging hen harriers have a low sensitivity to disturbance at operational wind farms and that birds will nest within 200 to 300 m of turbines (Whitfield and Madders, 2005). Therefore, it is considered that the magnitude of these impacts will be **low** during the operational period resulting in an effect which is **not significant**.

Habitat loss

7.8.39 The siting of the borrow pits will cause a direct impact due to temporary loss of 2.6 ha of potential nesting habitat (dry heath habitats), potentially displacing breeding birds. The construction of permanent wind farm infrastructure will also result in the loss of 1.9 ha of potential nesting habitat (dry heath) and 38 ha of foraging habitat across the site (all habitat loss from permanent structures at the Proposed Development, see **Chapter 8** for more information on habitat loss calculations). This is likely to be an overestimate as it includes all habitat loss within the site, not just areas in which hen harriers forage and have been recorded nesting. Natural succession processes mean that areas of heather which are currently suitable for nesting and/or foraging will become less so with time as the older heather eventually dies back, and new pioneer growth replaces it. Conversely, other areas of heather on site which are currently not tall or mature enough for nesting will mature, and so changing of suitable nesting areas is something that can be expected to happen naturally over time. There is alternative nesting habitat just outwith the site boundary. Furthermore, with embedded mitigation in place (see **Paragraphs 7.7.25-7.7.32**), displacement of a breeding pair is expected to be localised and temporary.

7.8.40 Given the extensive alternative habitat available for foraging both at the site and in the surrounding wider area, it is considered that impacts to harrier foraging from the construction of the wind farm will be of a low magnitude (see **Chapter 8** for further details of the habitats found at the site). In addition, loss of foraging habitat due to borrow pit and construction compound works will be medium term as reinstatement is planned for the mentioned temporary infrastructure.

7.8.41 The overall impacts associated with habitat loss during construction are expected to occur over the **short to medium term** and be of **moderate magnitude** and thus result in an effect which is **not significant** at the regional level, principally based on the loss of suitable nesting habitat. However, given that locations of suitable breeding habitat change naturally over time, and the lack of site loyalty shown by hen harriers within the site, a temporary, **moderate magnitude** impact is considered to be the worst-case scenario.

Merlin

Introduction

7.8.42 Merlin is an *Annex I* and *Schedule 1* species; it is also a SBL priority species and is LBAP listed. Merlin has moved back to the BoCC Red List from the Amber List in 2015 as its recovery from historical decline has faltered (Eaton *et al.*, 2015). The most recent national survey found that numbers of UK breeding merlin appear to be relatively stable (Ewing *et al.*, 2011).

7.8.43 In Scotland, merlin occur widely, and they are common in north-east Scotland with a healthy population, estimated at around 75-85 pairs (10 % of the Scottish population (Francis and Cook, 2011)). The species is a scarce resident breeder on upland heather moors, and a passage and winter visitor mainly to coastal and low-lying areas, with 733 breeding pairs (63 % of the UK population) estimated from the last census in 2008 (Ewing *et al.*, 2011). Since publishing of the census there has been some disagreement regarding the extrapolation from the stratified element of the survey, leading to a dispute over whether the published Scottish population estimate is too high. Using relative abundance scores from the Bird Atlas and real abundance from intensively studied NHZs, and apportioning them between all 21 NHZs, gives a Scottish population estimate of 433 pairs of which 13 are within NHZ 10 (Central Highlands) (Wilson *et al.*, 2015). In 2019 Scottish raptor workers found 161 occupied territories 32 of which were located in the Highlands and three in Nairn (Challis *et al.*, 2020).

Potential collision risk impact

7.8.44 Of the ten flights recorded, three flights of five individuals had a period spent in the CRZ at PCH, and all of these were recorded during the breeding season. Assuming a 98 % avoidance rate as recommended by NatureScot (SNH, 2017b), the predicted breeding season (and therefore also annual) mortality rate associated with the Proposed Development is 0.04 individuals per year (0.2 % of the NHZ 10 population).

7.8.45 As such, the potential impact as a result of collision risk is considered to be of **low magnitude**, resulting in an effect which is **not significant** for merlin.

Potential disturbance/displacement impacts

7.8.46 At least one pair of merlin have nested regularly within the site boundary. A territory was occupied in 2018 and 2019 during baseline breeding raptor surveys for the Proposed Development and a pair successfully fledged young in a different location within the site in 2011 to 2014.

7.8.47 The data provided by the HRSG included six occupied merlin breeding sites within 10 km of the Proposed Development between 2011 – 2020 excluding the nest outlined in the previous paragraph (see Confidential **Appendix 7.2**). Two of these breeding sites were within the survey area, one of which was within the site boundary (different to the nest mentioned in previous paragraph). The nest within the site boundary was last recorded as occupied in 2014 and was unoccupied in 2018, 2019 and 2020.

7.8.48 As such, there is a possibility that nesting and foraging merlin may be disturbed or displaced during construction and operation of the Proposed Development.

7.8.49 The maximum disturbance distance for this species is 500 m (Ruddock and Whitfield, 2007), and some infrastructure is located within 500 m of known nest sites. If merlin breed within the

site during the construction phase then construction activity could disturb or displace breeding merlin. However, with embedded mitigation in place (see **Paragraphs 7.7.25-7.7.32**.) it is considered that the magnitude of these impacts will be **short-term**, of **low magnitude**, resulting in an effect which is **not significant** for the regional merlin population during construction.

7.8.50 The impact of operational wind farms on the susceptibility to disturbance and displacement of breeding merlin is not well studied. A review of disturbance tolerance by birds reported that the median expert-opinion threshold at which breeding merlin show a response to human disturbance was 225 m during the incubation stage and 400 m during chick-rearing (Whitfield et al. 2008). Based upon review of other raptor species, Madders and Whitfield (2006) suggest that it is highly unlikely that merlin will be displaced by operational wind farms. In view of the limited information available to date, it is conservatively assumed for the purpose of this assessment that nesting merlin would be displaced from areas within 500 m of operating turbines. No merlin nest was recorded within 500 m of proposed turbine locations, which suggests that no pairs would be displaced by operating turbines.

Habitat Loss

7.8.51 The siting of the borrow pits will cause a direct impact due to temporary loss of 2.6 ha of potential nesting habitat, potentially displacing breeding birds. The construction of permanent wind farm infrastructure will also result in the loss of 1.9 ha of potential nesting habitat and 38 ha of foraging habitat (see **Paragraph 7.8.39** for further information). Natural succession processes mean that areas of heather which are currently suitable for nesting and/or foraging will become less so with time as the older heather eventually dies back, and new pioneer growth replaces it. Conversely, other areas of heather on site which are currently not tall or mature enough for nesting will mature, and so changing of favoured nesting areas is something that can be expected to happen naturally over time. There is alternative nesting habitat outside the site boundary and in the surrounding area. As such any displacement of a breeding pair is expected to be localised and temporary.

7.8.52 Given the extensive alternative habitat available for foraging both at the Proposed Development and in the surrounding wider area, it is considered that impacts to foraging merlin from the construction of the wind farm will be **negligible** in magnitude (see **Chapter 8** for further details of the habitats found at the site). In addition, loss of foraging habitat due to borrow pit and construction compound works will be medium term as reinstatement is planned for the mentioned temporary infrastructure.

7.8.53 With the application of embedded mitigation measures (see **Paragraphs 7.7.25-7.7.32**), the overall impacts associated with disturbance/displacement are expected to occur over the **short to medium term** and be of **low magnitude** and thus resulting in an effect which is **not significant** for the regional merlin population during construction, reducing to **negligible** and **not significant** during operation.

Red kite

Introduction

7.8.54 Red kite is an *Annex I* and *Schedule 1* species and is listed as a SBL priority species and is listed on the Highland LBAP. Red kite has successfully been reintroduced to Scotland in four schemes across the country, having originally becoming extinct in Scotland in the late 19th century. Red kite is now a scarce and localised resident breeder, but numbers are increasing each year. In 2019 the Scottish population stood at 261 breeding pairs (Challis *et al*., 2020). Red kites were reintroduced to the Black Isle, Inverness-shire between 1989 and 1994. This region has seen population growth but has suffered in particular from illegal persecution. Recent years' data shows a continued increase in the Highland red kite population, e.g., nine

pairs in 2017 (Challis *et al*., 2018), and 37 pairs in 2018 (Challis *et al*., 2019). In 2019, Scottish raptor workers located 42 territories occupied by pairs in Highland (none in Nairn but nine in the neighbouring Inverness-shire and one in Badenoch and Strathspey; Challis *et al*. 2020).

7.8.55 Data requests to RSPB returned one record of an individual within 10 km of the Proposed Development in 2010. No data regarding red kite nests or winter roosts within 10 km of the Proposed Development were returned by the HRSG.

Potential collision risk impact

7.8.56 The majority of flights during the breeding seasons were recorded in 2019 (12 flights), with four flights in 2018. Also, two incidental red kite flights were recorded during VP surveys and six flights during raptor surveys. Most flights over the Proposed Development occurred over open ground in the south and over the ridge in the southeast.

7.8.57 CRM was undertaken for this species during the breeding season, and the output estimates based upon an avoidance rate of 99% as recommended by NatureScot (SNH, 2017b) were of 0.12 collisions for the breeding season (and therefore annually). The collision rate predicted for the breeding season (0.12 birds) represents 0.1 % of the total of Highland breeding individuals (42 pairs in 2019). No estimate is given for the NHZ 10 population, but surrounding NHZ population estimates range from seven breeding pairs in NHZ 12 (North East Glens) to 50 breeding pairs in NHZ 21 (Moray Firth). The predicted collision rate at the Proposed Development represents 0.9 % of the NHZ 12 population and 0.12 % of the NHZ 21 population.

7.8.58 Annual survival rates for red kite have been calculated as being 0.91 for adults (wild-hatched, in areas without illegal persecution), and 0.58 for birds in their first year (Sansom *et al*., 2016). Thus, the predicted collision rate is unlikely to be detectable against background mortality. However, it is not certain whether red kites recorded within the site during baseline surveys were individuals from a newly established nearby breeding site or whether they were, in fact, non-breeding birds overflying the site. Nonetheless, the Highland red kite population continues to grow at a time when the number of wind farms in the region is also increasing and thus far, there is no evidence of collisions with turbines affecting the regional population. In light of this, it is considered that collision risk to red kite is of **low magnitude** resulting in an effect which is **not significant** at the regional level.

7.8.59 There is no predicted habitat loss or disturbance impact on red kite as no evidence was found of this species using the site for breeding. Habitat loss is not predicted to have an impact on red kite foraging. This is because of to the limited evidence of red kite foraging within the site, the limited amount of habitat loss from the Proposed Development and the extensive available foraging habitat available within the site and the surrounding area.

Short-eared owl

Introduction

7.8.60 Short-eared owl is a restricted resident breeder in Scotland, with the highest numbers of breeding birds being found in the uplands of south, central and eastern Scotland, as well as Orkney and some Hebridean islands (Forrester *et al*., 2007). Most breeding birds move south in winter but the wintering Scottish population may be supplemented by birds arriving from the continent in the autumn. Short-eared owl are highly nomadic and their numbers, distribution and breeding success can vary year by year, as they are strongly associated with cyclic population of field voles. The estimated number of breeding short-eared owls in Scotland varies from 125-1,250 pairs. Short-eared owl is *Annex I* listed, appears on the SBL and is amber-listed on BoCC.

7.8.61 The latest Highland bird report (Bain *et al*., 2019) describes short-eared owl as an increasingly scarce and local breeder, with one report of an occupied breeding site in 2019 (status

unknown). In 2019, Scottish raptor workers located 25 pairs across Scotland, with only one located in the Highlands, this being in Caithness (Challis *et al*., 2020). The NHZ 10 estimate is zero, however, it is acknowledged that there is a dearth of knowledge about this species (Wilson, *et al*., 2015).

Potential disturbance/displacement impacts

7.8.62 There is little evidence, and mixed opinion, as to the distance at which short-eared owls are disturbed by human activity (Ruddock & Whitfield, 2007). However, all expert opinions quoted suggest a disturbance distance of no more than 600 m, with the upper 90 % of opinions stating an "alert distance" of 300 to 500 m. The location for the probable short-eared owl nesting attempt in 2018 was within 500 m of proposed infrastructure, meaning that there is potential for disturbance or displacement of one pair of short-eared owls during the construction of the Proposed Development. This is between 0.8 and 0.08 % of the estimated Scottish breeding population and 100 % of the 2019 reported Highland population. However, the calculated percentage of the Highland population is a highly conservative estimate due to the lack of understanding of the short-eared owl breeding population numbers.

7.8.63 Short-eared owl is believed to have nested within the site boundary in 2018. The evidence recorded during the BBS was suggestive of breeding, however, the nest was not located. No evidence of short-eared owl breeding within the site boundary in 2019 was found. Furthermore, short-eared owls are highly nomadic (BTO, undated) and it is not unusual for territories to be only periodically occupied. It is therefore likely that short-eared owls would not breed in the same location at the Proposed Development. There is also extensive alternative habitat within the site and surrounding area for short-eared owls to breed in. With embedded mitigation in place (see **Paragraphs 7.7.25-7.7.32** it is considered that the magnitude of these impacts will be **short-term**, of **low magnitude**, resulting in an effect which is **not significant** for the regional short-eared owl population during construction.

7.8.64 The impact of operational wind farms on the susceptibility to disturbance and displacement of breeding short-eared owl is not well studied. In view of the limited information available to date, it is conservatively assumed for the purpose of this assessment that nesting short-eared owl would be displaced from areas within 500 m of operating turbines (based on the disturbance distances outline in Ruddock and Whitfield (2007)). The short-eared owl territory recorded in 2018 was within 500 m of proposed infrastructure. However, as short-eared owls are highly nomadic and were only recorded at the site during one out of the two breeding season surveys it is very unlikely that short-eared owl would breed in the same location in future years. Furthermore, there is extensive suitable habitat for nesting short-eared owls away from proposed turbines both within the site and the surrounding area.

Habitat loss

7.8.65 The siting of the borrow pits and construction compounds will cause a direct impact due to temporary loss of up to 6 ha of potential nesting habitat, potentially displacing breeding birds. The construction of permanent Proposed Development infrastructure will also result in the loss of 38 ha of foraging and nesting habitat (see **Paragraph 7.8.39** for further information). As previously stated, there is alternative nesting habitat both within and surrounding the site and as such any displacement of a breeding pair is expected to be localised and temporary.

7.8.66 Given the extensive alternative habitat available for foraging both at the Proposed Development and in the surrounding wider area, it is considered that impacts to foraging short-eared owl from the construction of the Proposed Development will be **negligible**. In addition, loss of foraging habitat due to borrow pit and construction compound works will be medium term as reinstatement is planned for the mentioned temporary infrastructure.

7.8.67 With the application of embedded mitigation measures (see **Paragraphs 7.7.25-7.7.32.**), the impacts associated with disturbance/displacement during the construction phase are expected

to occur over the **short to medium term** and be of **low magnitude** resulting in an effect which is **not significant** for the regional short-eared owl population during construction, reducing to **negligible** during operation.

Curlew

Introduction

7.8.68 Curlew is a LBAP priority species and is included on the SBL and BoCC Red List, partly due to a widespread decline in the UK breeding population (Eaton *et al*., 2015). With an estimated 58,500 breeding pairs (representing 20 to 27 % of the European breeding population) curlew is a widespread resident breeder in Scottish farmland and upland habitats (Forrester *et al*., 2007). The species is also a common passage and winter visitor to coasts and nearby fields - *c*.85,700 birds in winter represent 20 % of the East Atlantic flyway population (Forrester *et al*., 2007). The NHZ 10 population is estimated at 811 breeding pairs (Wilson *et al*., 2015). Recent records for Scotland indicate a 59 % decline in breeding birds between 1995 and 2018 (Sim *et al*., 2005). In the Highlands curlew is described as a common but declining breeder and common winter visitor in the Inner Moray Firth but uncommon elsewhere (Bain *et al*., 2019).

Potential collision risk impact

7.8.69 In years 2018-2019, there were total of 62 flights (69 individuals) recorded during VP surveys; 40 flights were recorded in 2018, 22 in 2019. A total of 11 flights occurred in the CRZ at PCH. A total of 19 incidental records were also made during VP surveys, with most flights being of individual birds during the breeding season.

7.8.70 The predicted collision rate for curlew at 98 % avoidance as recommended by NatureScot (SNH, 2017b)is 0.12 collisions per breeding season (and therefore also annual mortality rate, 0.01 % of the NHZ 10 breeding population). This represents 0.3 % of the NHZ 10 breeding population (1,622 breeding individuals; Wilson *et al*., 2015).

7.8.71 As such, the potential collision impact on curlew during the operational phase is considered to be of **low magnitude,** resulting in an effect which is **not significant**.

Potential disturbance/displacement impacts

7.8.72 Curlew was the most abundant breeding wader species at the Proposed Development, with 14 estimated breeding territories recorded in 2018 (one territory outwith the site boundary).

7.8.73 Curlew are considered to be highly sensitive to disturbance, but studies assessing the disturbance effects of wind farms on curlew have shown contrasting results and to some extent there are likely to be differing responses on a site-by-site basis. Waders are most susceptible to disturbance at the chick-rearing stage (Yalden *et al*., 1990) and should the disturbance level be sufficient, this can lead to displacement. It has been shown that as a result of disturbance from construction work, curlew abundance may decline by approximately 40 % within 620 m of turbines (Pearce-Higgins *et al*., 2012). Previous to this analysis, other studies have estimated the curlew avoidance distance from wind turbines to be 800 m (Pearce-Higgins *et al*., 2009) and 500 m (Thomas et al., 1999). Using the value of a 620 m disturbance distance causing a 40 % decline in this assessment for the Proposed Development, this would indicate that the 700 m separation distance between the curlew territory and the nearest proposed turbine is sufficient for a pair to avoid the effects of disturbance. Based on these predictions, up to four pairs breeding within the Proposed Development may be affected: ten pairs in 2018 bred within 620 m of the nearest proposed turbine; a 40 % reduction on a baseline of ten pairs would be a loss of four pairs. As a proportion of the relevant NHZ population (811 breeding pairs in NHZ 10; Wilson *et al*., 2015), the number of pairs affected would be low (0.5 % of the NHZ population). In addition, curlew move their precise nesting locations between years, and there is extensive available alternative suitable open ground habitat both within and

surrounding their current territories, at a greater distance from infrastructure, and so any displacement is likely to be localised. Risks during the vulnerable periods can be minimised by conducting pre-construction and construction surveys to locate potential nests and ceasing of works within exclusion buffers if nesting attempts are made (see **Paragraphs 7.7.25-7.7.29 7.x**). In light of this, displacement of curlew due to disturbance during the construction phase is likely to be of a **low magnitude**, resulting in an effect which is **not significant** at the regional level.

7.8.74 It has been shown that disturbance to curlew during wind farm operation is lower than during the construction phase, as shown by Pearce-Higgins *et al*. (2009). In another study, involving long-term monitoring, no evidence of displacement was found due to wind farm infrastructure for curlew (Whitfield *et al*., 2010). In fact, at one of the study sites (Black Law) three territories were recorded within 200 m of turbines. However, because curlews use different nest sites each year it is difficult to predict how many pairs will be displaced by operational turbines. It is generally assumed that if curlew were displaced from a site during construction, it is less likely that they will return to breed in the same area during wind farm operation (Pearce-Higgins *et al*., 2012). As explained above, the predicted loss of four breeding pairs would be low in the context of the NHZ 10 breeding population (0.5 %). Due to the abundance of potentially suitable nest sites within the site and the surrounding locale, and the relatively small area of suitable nesting habitat that will be lost, nesting habitat loss will be negligible. In light of this, displacement of curlew due to disturbance during the operation phase is likely to be of a **low magnitude**, resulting in an effect which is **not significant** at the regional level.

Golden Plover

Introduction

7.8.75 Golden plover is a widespread resident breeder in upland areas and is found in lowland farmland and near coasts in winter. Numbers increase during passage and in winter by birds arriving from northern Europe and Iceland/ Greenland. The species is listed on *Annex I* of the *Birds Directive* and is an SBL and LBAP priority species. It was recently moved from the UK BoCC Green List to the Amber List due to the international importance of non-breeding birds in the UK (Eaton *et al.*, 2015).

7.8.76 Most recently, the UK golden plover breeding population is estimated to be 32,500-50,500 pairs (Woodward *et al.*, 2020a) although Forrester *et al.* (2007) give a Scottish breeding population estimate of 15,000 pairs, stating that this represents 80 % of the British breeding population. Forrester *et al.* (2007) give a Scottish wintering population of 25,000 to 35,000 individuals. Numbers of golden plover in Scotland have experienced mixed fortunes in different areas, with significant declines in southern Scotland and significant increases in north-west Scotland and the Outer Hebrides (Sim *et al*., 2005). The most recent estimate of the number of golden plover breeding pairs in NHZ10 is *c.* 2,702 (Wilson *et al.,* 2015). No estimate of the non-breeding population is given for the NHZ. The non-breeding season population of golden plover consists of different birds to the Scottish breeding population, with migratory birds arriving from Iceland, Greenland and Fennoscandia (Forrester *et al*., 2007). The wintering population is likely to be highly transitory and to occur in fluxes, both temporally and geographically. The BTO BirdTrends website (Woodward *et al*., 2020b) states that since 1995 the golden plover population shows stability in Scotland and in the UK as a whole.

Potential disturbance/displacement impacts

7.8.77 Up to ten breeding territories were estimated within the survey area (site boundary plus 500 m); therefore, disturbance to breeding golden plover during construction is likely. Waders are most susceptible to disturbance at the chick-rearing stage (Yalden *et al*., 1990) and should the disturbance level be sufficient, this could lead to displacement. As golden plover has been found to be displaced by operational turbines by up to 400 m (Sansom *et al.*, 2016)

displacement may occur during construction or operation of the Proposed Development. With a 400 m disturbance distance, the territory mapping produced from the BBS suggests that seven pairs would be displaced from the site. This would represent 0.3 % of the NHZ 10 breeding population. As golden plover move their precise nesting locations between years, and there is extensive available alternative suitable open ground habitat both within and surrounding their current territories at a greater distance from infrastructure, any displacement is likely to be localised. Risks during the vulnerable periods will be minimised by conducting pre-construction and construction surveys to locate potential nests and avoiding works within exclusion buffers if nesting attempts are made (see **Paragraphs 7.7.25-7.7.29**). In light of this, displacement of golden plover due to disturbance during the construction phase is likely to be of a **moderately adverse** magnitude, resulting in an effect which is **not significant** at the local level.

7.8.78 Golden plover are relatively well studied in relation to disturbance/displacement on wind farm sites and it has been shown that, in most cases, no redistribution of birds away from tracks and infrastructure occurs post-construction (Douglas *et al*., 2011). Also, it has been shown that disturbance to waders at an operational wind farm is lower than during the construction phase, as shown by Pearce-Higgins *et al*. (2009). A study of displacement impacts of wind farms on ten species of upland breeding birds found that there was little change in the densities of breeding golden plover (Pearce-Higgins *et al*., 2012). Moreover, golden plover was not identified as being particularly sensitive to wind farm developments during the wintering period (McGuiness *et al*., 2015). A review of 29 other studies suggests golden plover will approach wind turbines to an average distance of 175 m in the non-breeding season (Hötker *et al*., 2006). Although up to seven breeding golden plover pairs may be affected by the operation of the Proposed Development, given the relative abundance of alternative habitat within and surrounding the Proposed Development, the loss of nesting or foraging habitat for golden plover within the site will be negligible. In light of this, displacement of golden plover due to disturbance during the operational phase is likely to be of a **low adverse** magnitude, resulting in an effect which is **not significant** at the local level.

7.8.79 There is no evidence to suggest that the Proposed Development lies on a migratory/ regular commuting route for the species; therefore, a barrier effect is not anticipated.

7.9 Further Mitigation

7.9.1 The Proposed Development is predicted to have a moderate, low or negligible impact, on all of the IOFs recorded, all of which result in non-significant effects. However, additional mitigation is proposed in order to further minimise impacts.

Habitat Management Plan

7.9.2 It is proposed that post-consent and as part of the proposal, a detailed HMP will be produced, secured by planning condition and discharge by local planning authorities. The proposed principle aims of this plan will be:

- To restore blanket bog and wet heath habitats in an area within the site with associated benefits for upland species such as black grouse, curlew and golden plover; and
- To encourage areas of deep heather in an area away from turbines in order to provide alternative nesting habitat for hen harrier, merlin and short-eared owl. This will be done by managing the heather burning/cutting regime.

7.9.3 The bog and wet heath restoration will be achieved by ditch blocking to rewet drained areas of peatland which will benefit upland waders nesting within the site. A monitoring regime will be included as part of this plan in order to assess the effectiveness of management measures implemented as part of the HMP (more details are provided in **Appendix 8.3**).

Decommissioning

7.9.4 Mitigation of decommissioning activities will follow that proposed for the embedded mitigation of construction activities, including pre-decommissioning surveys and ecological supervision of activities (e.g., by an ECoW).

7.10 Residual Effects

7.10.1 The Proposed Development is not predicted to have a significant residual effect on any IOF. However, some species such as waders and raptors are expected to see longer term benefit as a result of peatland/heathland restoration measures proposed under the HMP (see **Chapter 8** and **Appendix 8.3** for further information).

7.10.2 **Table 7.19** below provides summary of the potential residual effects on the local bird assemblage following the implementation of the HMP at the site.

7.11 Cumulative Effects

7.11.1 The following section assesses the predicted cumulative effects on IOFs from the Proposed Development along with all other developments within an appropriate ZoI and against the relevant NHZ population estimates, following NatureScot guidance (SNH, 2018b).

7.11.2 In line with this guidance, any wind farm developments of fewer than three turbines (small scale wind energy proposals) were excluded from the cumulative impact assessment, due to the problems associated with finding appropriate data for developments of this size. Only IOFs for which a greater than negligible residual impact is predicted are considered in the cumulative impact assessment, as negligible impacts will not result in a detectable increase in cumulative impacts. All existing, consented and submitted developments (of three or more turbines) within 10 km of the Proposed Development, were considered as part of the assessment of cumulative impacts. Five EIA developments were located within this search area, as follows:

- Cairn Duhie Wind Farm (consented) – This is a 20-turbine consent, which has not been constructed, located 4.8 km to the north-east of the Proposed Development.
- Tom nan Clach Wind Farm (operational) – This is a 13-turbine operational site, located 4.9 km to the south-west of the Proposed Development.
- Tom nan Clach Wind Farm extension (scoping)
- Ourack Wind Farm (scoping)
- Remore Quarry (consented) – This is a sand and gravel quarry with consent granted in August 2021, located 9.2 km north of the Proposed Development.

7.11.3 Ourack Wind Farm and Tom nan Clach Wind Farm extension are in the EIA scoping stage, which means that no EIA Report is available for either development and they have therefore not been included as part of this assessment.

7.11.4 It should be noted that cumulative assessments may be complicated by availability of EIA/ES chapters and Appraisals for consented developments and, where this information is available, survey periods and methods may differ between sites. Furthermore, some wind farms may have been in existence for many years, and thus contemporary data may not be available. Information to inform the Cumulative Impact Assessment (CIA) was available from one consented and one operational wind farm, plus one consented quarry.

7.11.5 The IOFs for which cumulative effects may occur (i.e., those for which a higher than negligible magnitude residual impact is predicted) are as follows:

- Greylag goose: collision risk;
- Pink-footed goose: collision risk;

- Whooper swan: collision risk;
- Golden eagle: collision risk;
- Hen harrier: disturbance/displacement effects and collision risk;
- Merlin: collision risk;
- Red kite: collision risk;
- Curlew: disturbance/displacement effects and collision risk; and
- Golden plover: disturbance/displacement effects.

7.11.6 The residual effect of the individual operational and consented developments for which information was available and the cumulative residual effect on each of the target species most likely to be affected by cumulative effects (as listed above) is described in **Table 7.18** below.

7.11.7 No additional significant cumulative disturbance/displacement or collision effects were concluded for any IOFs.

Table 7.18: Summary of the potential cumulative effects of operational and consented developments within 10 km of the Proposed Development on IOFs

Site	Lethen Wind Farm	Cairn Duhie Wind Farm	Tom nan Clach Wind Farm	Remore Quarry	Cumulative residual effects
Site status	**17 turbines** Baseline surveys undertaken in 2018 – 2019.	**20 turbines** Baseline surveys undertaken in 2011 – 2012. Additional ornithology surveys undertaken in winter 2019/2020.	**13 turbines** Operational since 2018. Baseline surveys undertaken in 2014 – 2015.	**Sand and gravel quarry** Consented Baseline surveys undertaken in 2018.	**50 turbines**

Receptor	Lethen Wind Farm	Cairn Duhie Wind Farm	Tom nan Clach Wind Farm	Remore Quarry	Cumulative residual effects
Greylag goose	Total of 91 flights (430 individuals) recorded during VP surveys. Predicted collision mortality for greylag goose is 0.77 birds per breeding season and 0.37 during the non-breeding season (annual collision mortality is 1.14 birds).	Total of 57 flights recorded during VP surveys. Predicted collision mortality for greylag goose is 0.0032 birds per breeding season and 0.4242 birds per non-breeding season (annual collision mortality is 0.4274 birds).	Total of five flights (34 individuals) were recorded during VP surveys. Predicted collision risk of 0.15 birds per year.	No predicted impacts	CRM was undertaken for two sites in addition to the Proposed Development giving an estimate of 1.72 collisions per year across all sites (0.77 in the breeding season, 0.79 in the non-breeding season). Breeding season collision mortality from Lethen and Cairn Duhie represents 0.002 % of the Scottish breeding population. Non-breeding season collision mortality represents an undetectable number of the Scottish wintering population. Cumulative predicted collision rate would be undetectable against background annual mortality. Cumulative collision risk is predicted to be of **negligible** magnitude at the regional level**,** resulting in **no significant effect.**

Receptor	Lethen Wind Farm	Cairn Duhie Wind Farm	Tom nan Clach Wind Farm	Remore Quarry	Cumulative residual effects
Pink-footed goose	Total of 18 flights (838 individuals) recorded during VP surveys. Predicted collision mortality for pink-footed goose is 0.87 birds per non-breeding season and 1.22 birds annually.	Total of six flights (470 individuals) recorded during VP surveys. Predicted collision mortality for pink-footed goose is 0 birds per summer and 0.5819 birds per winter (therefore also annual estimate).	Total of 13 flights (903 individuals) were recorded during VP surveys. Predicted collision risk of 0.58 birds per year.	No predicted impacts	CRM was undertaken for two sites in addition to the Proposed Development, giving an estimated 2.38 collisions per year across all sites (which would represent <0.01 % of the Scottish and UK populations). Cumulative predicted collision rate would be undetectable against background annual mortality. Cumulative collision risk is predicted to be of **negligible** magnitude at the regional level**,** resulting in **no significant effect.**
Whooper swan	Total of six flights (62 individuals) recorded during VP surveys. Predicted collision mortality for whooper swan is 0.36 birds per non-breeding season.	Total of one flight recorded during VP surveys. No CRM conducted for whooper swan.	No whooper swan flights recorded during VP surveys.	No predicted impacts	There were few whooper swan records from other sites (they were recorded on one other site where the flight activity was too low to undertake CRM). CRM was therefore only undertaken for the Proposed Development giving an estimate of 0.36 collisions per year (which would represent <0.2 % of the total population estimates of NHZ 12, 16 and of the most recent British wintering population estimate). Cumulative predicted collision rate would be undetectable against annual mortality. Cumulative collision risk is predicted to be of a **low adverse** magnitude at the regional level, resulting in **no significant effect.**
Golden eagle	Total of seven flights (seven individuals – all flights by immature bird) recorded during VP surveys in the 2018 breeding season. Predicted collision mortality for golden eagle is 0.02 birds per breeding season	No golden eagle flights recorded during VP surveys.	Total of 12 flights (12 individuals) recorded during VP surveys. Predicted collision mortality for golden eagle is 0.02 birds per breeding season (0.08 % of the breeding NHZ 10 population).	No predicted impacts	CRM was undertaken for one site in addition to the Proposed Development giving an estimate of 0.04 collisions per year across the two sites. This represents 0.2 % of the breeding population estimate for NHZ 10. The cumulative predicted collision rate of these two sites is unlikely to be detectable against background mortality.

Receptor	Lethen Wind Farm	Cairn Duhie Wind Farm	Tom nan Clach Wind Farm	Remore Quarry	Cumulative residual effects
	(0.08 % of the breeding NHZ 10 population). No evidence of breeding within the Proposed Development site.				Cumulative collision risk is predicted to be of a **low adverse** magnitude at the regional level, resulting in **no significant effect.**
Hen harrier	Total of 28 flights (28 individuals) recorded during VP surveys. Predicted collision mortality is 0.03 birds per breeding season, representing 0.1 % of the NHZ 10 population. Two pairs attempted to breed within the Proposed Development site in 2018, one pair in 2019. Displacement of one pair equates to a loss of 5.5 % of the NHZ 10 breeding population Habitat management improvements to increase the provision of deep heather for hen harrier nesting away from the turbine area will benefit breeding birds. Habitat management improvements to blanket bog and wet heath will benefit foraging birds.	Total of five flights recorded during VP watches with no flights in the CRZ. No evidence of breeding within 2 km of the site in 2012. No evidence of roosting within 500 m of site during 2011/2012 and 2019/2020 winter surveys. With the exception of flight activity surveys, no hen harrier were recorded during baseline surveys. Habitat management improvements to blanket bog and wet heath will benefit foraging birds and encourage activity away from proposed turbines. Due to the absence of breeding and roosting activity, and no predicted collision risk, hen harrier was scoped out of the assessment.	Total of 11 flights (11 individuals) recorded during VP surveys. Predicted collision risk was one collision every 131 years during breeding season (0.008 birds, 0.02 % of the breeding NHZ 10 population), and one collision every 224 years during non-breeding season (0.005 birds).	No predicted impacts	No hen harrier territory was recorded in the survey areas of the listed developments. Therefore, the one hen harrier territory found at the site is the only nest included in the cumulative assessment. This represents 5.6 % of the NHZ 10 population estimate of 18 pairs. However, there is extensive nesting and foraging habitat in the area surrounding the three developments and hen harriers have been shown to nest successfully in close proximity to wind turbines. It is therefore unlikely that both nesting pairs will be permanently displaced by these wind developments. Furthermore, habitat management at the Proposed Development will provide areas of deep heather away from turbines in which hen harriers could nest. It is therefore predicted that cumulative disturbance/ displacement effects will be of low adverse magnitude and not significant. CRM was undertaken for one site in addition to the Proposed Development giving an estimate of 0.04 collisions per year across these two sites. This represents 0.1 % of the breeding population estimate for NHZ 10. Therefore, cumulative collision risk is predicted to be of **low adverse** magnitude at the regional level, resulting in **no significant effect.**

Receptor	Lethen Wind Farm	Cairn Duhie Wind Farm	Tom nan Clach Wind Farm	Remore Quarry	Cumulative residual effects
Merlin	Total of ten flights (13 individuals) recorded during VP surveys. Predicted collision mortality is 0.04 birds per breeding season, representing 0.2 % of the NHZ 10 population. One pair was recorded breeding within the Proposed Development site. Displacement of the pair equate to a loss of 7.7 % of the NHZ 10 breeding population.	Total of one flight recorded during VP surveys. Predicted collision mortality is 0 birds per breeding season and 0.0037 birds per non-breeding season (annual collision mortality of 0.0037 bird representing 0.01 % of the NHZ 10 breeding population). No evidence of breeding within 2 km of the site.	Total of two flights (two individuals) recorded during VP surveys. Predicted collision risk was one collision every 862 years (0.001 birds per year, 0.004 % of the breeding NHZ population). Merlin probably attempted to breed within the 2 km survey buffer in 2014. One nest located in 2015 in the 2 km survey buffer, used intermittently. Further potential breeding locations within the vicinity of the Proposed Development.	No predicted impacts	One merlin territory was recorded in total in the survey areas of the listed developments. Together with the single pair of breeding merlin within the Proposed Development this represents 15.4 % of the NHZ 10 population estimate of 13 pairs. However, there is extensive nesting and foraging habitat in the area surrounding the three developments. It is therefore unlikely that the pair will be permanently displaced by the Proposed Development. Furthermore, habitat management at the Proposed Development will provide areas of deep heather away from turbines in which merlin could nest. It is therefore predicted that cumulative disturbance/ displacement effects will be of low adverse magnitude and not significant. CRM was undertaken for two sites in addition to the Proposed Development giving an estimate of 0.045 collisions per year across all sites. This represents 0. 2 % of the breeding population estimate for NHZ 10. Therefore, cumulative collision risk is predicted to be of **low adverse** magnitude at the regional level resulting in **no significant effect.**
Red kite	Total of 17 flights (18 individuals) recorded during VP surveys. Predicted collision mortality for red kite is 0.12 birds per breeding season. No evidence of breeding within the Proposed Development site.	No red kite flights recorded during VP surveys.	Total of 30 flights (32 individuals) recorded during VP surveys. Predicted collision mortality for red kite is 0.12 birds per breeding season.	No predicted impacts	CRM was undertaken for one site in addition to the Proposed Development giving an estimate of 0.24 collisions per year across the two sites. This represents 0.24 % of the breeding population estimate for NHZ 21 and 0.3 % of the 84 breeding birds estimated in Highland in 2019. Therefore, cumulative collision risk is predicted to be of **low adverse** magnitude at the regional level, resulting in **no significant effect.**

Receptor	Lethen Wind Farm	Cairn Duhie Wind Farm	Tom nan Clach Wind Farm	Remore Quarry	Cumulative residual effects
Curlew	Total of 62 flights (69 individuals) recorded during VP surveys. Predicted collision mortality is 0.12 birds per breeding season, representing 0.01 % of the NHZ 10 population. Up to 14 pairs were recorded breeding within the Proposed Development site. Predicted displacement estimated at four pairs (0.5 % of the NHZ 10 population). Habitat management improvements for blanket bog and wet heath habitats away from turbines will benefit curlew and provide improved breeding habitats.	Total of 27 flights recorded during VP surveys. Predicted collision mortality is 0.0538 birds per breeding season and 0.0065 birds per non-breeding season (annual collision mortality of 0.0602 representing 0.003 % of the breeding NHZ 10 population). Breeding activity data not available but stated the potential loss of one pair as a result of the Proposed Development equating to a loss of 0.12 % of the NHZ population.	Total of 20 flights (32 individuals) recorded during VP surveys. Predicted collision risk of 0.15 birds per breeding season, representing 0.02 % of the NHZ 10 breeding population. No curlews recorded nesting within 500 m of turbine locations in 2014, with three territories recorded in 2015. In 2014, 19 territories confirmed within 500 m of proposed main access track.	No predicted impacts	A total of 23 curlew territories were recorded within 500 m of infrastructure at the listed developments. Together with the four pairs recorded within 500 m of the Proposed Development this represents 3.3 % of the breeding population estimate for NHZ 10 of 811 pairs. However, there is extensive nesting and foraging habitat in the area surrounding the three developments. It is therefore unlikely that all pairs will be permanently displaced by these wind developments. Furthermore, wet heath and blanket bog habitat management at the Proposed Development will improve foraging and nesting habitat for curlew away from turbines. CRM was undertaken for two sites in addition to the Proposed Development giving an estimate of 0.33 collisions per year across all sites. This represents 0.02 of the breeding population estimate for NHZ 10. Therefore, cumulative disturbance/ displacement and collision impacts are predicted to be of low **adverse** magnitude at the regional level, resulting in **no significant effect.**
Golden plover	Total of eight flights (10 individuals) recorded during VP surveys. Only one of the breeding season passed through the risk area at risk height. CRM was therefore not conducted for golden plover.	Not records during flight activity surveys. Three golden plover pairs were identified breeding on site and if displaced would represent a loss of 0.1 % of the NHZ 10 breeding population.	Total of eight flights (29 individuals) recorded during VP surveys. Predicted collision mortality of 0.064 birds per breeding season (0.001 % of the NHZ 10 breeding population).	No predicted impacts	A total of 22 golden plover territories were recorded within 500 m of infrastructure at the listed developments. Together with the seven pairs recorded within 500 m of the Proposed Development this represents 0.8 % of the breeding population estimate for NHZ 10 of 2,702 pairs. However, there is extensive nesting and foraging habitat in the area surrounding the three developments. It is therefore unlikely that all pairs will be permanently displaced by these wind developments. Furthermore, wet heath and blanket bog habitat management at the Proposed

Receptor	Lethen Wind Farm	Cairn Duhie Wind Farm	Tom nan Clach Wind Farm	Remore Quarry	Cumulative residual effects
	Up to ten pairs were recorded breeding within the Proposed Development site. Predicted displacement estimated at seven pairs (0.3 % of the NHZ 10 population).		Seven confirmed breeding territories of golden plover were located within a 500 m buffer of the proposed turbines in 2014. Four territories in 2015. In 2014, 12 confirmed golden plover territories were located within 500 m of the proposed main access track.		Development will improve foraging and nesting habitat for golden plover away from turbines. CRM was undertaken for one site giving an estimate of 0.06 collisions per year. This represents 0.001 % of the breeding population estimate for NHZ 10. Therefore, cumulative disturbance/ displacement and collision impacts are predicted to be of **low** adverse magnitude at the regional population level, therefore **no cumulative significant effects** are predicted.

7.12 Summary

7.12.1 In order to inform the EIA, 18 months of ornithological survey work was undertaken at the Proposed Development between March 2018 and August 2019 (two breeding seasons and one non-breeding season). NatureScot agreed that a second non-breeding season survey was not required at the Proposed Development. Surveys comprised of VP flight activity surveys, BBS, raptor and black grouse surveys.

7.12.2 An assessment has been made of the predicted significance of effects of the Proposed Development on ornithological interests. This assessment predicted no significant effect, on all of the IOFs recorded. In addition, six capercaillie SPAs within 25 km of the Proposed Development have been taken forward for Appropriate Assessment. These are dealt with in a separate HRA Screening document.

7.12.3 Habitat enhancement measures targeted at hen harrier, merlin and short-eared owl (heather management to encourage areas of deep heather) and curlew and golden plover (blanket bog restoration) are proposed. Embedded mitigation measures are proposed to minimise impacts of the construction and operation of the Proposed Development on IOFs, and to prevent a breach of legislation under the Wildlife and Countryside Act (1981) as amended by the Nature Conservation (Scotland) Act (2004). A SPP is proposed and good practice guidance regarding breeding birds will be followed, with an ECoW employed during construction. It is considered that implementation of these embedded mitigation and habitat enhancement measures will reduce the likelihood of impacts on IOFs at the appropriate biogeographical scale.

Table 7.19: Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/Adverse		Significance	Beneficial/Adverse
During Construction/Decommissioning: Disturbance and/or displacement and habitat loss (breeding)					
Greylag goose	Not significant	Low adverse	No specific mitigation required (after implementation of embedded mitigation)	Not significant	Low adverse
Hen harrier	Not significant	Moderate adverse	No specific mitigation required (after implementation of embedded mitigation)	Not significant	Low adverse
Merlin	Not significant	Low adverse	No specific mitigation required (after implementation of embedded mitigation)	Not significant	Low adverse
Short-eared owl	Not significant	Low adverse	No specific mitigation required (after implementation of embedded mitigation)	Not significant	Low adverse
Curlew	Not significant	Low adverse	No specific mitigation required (after implementation of embedded mitigation)	Not significant	Low adverse
Golden plover	Not significant	Moderate adverse	No specific mitigation required (after implementation of embedded mitigation)	Not significant	Moderate adverse
During Operation: Disturbance and/or displacement (breeding)					
Hen harrier	Not significant	Low adverse	Heather management measures to enhance suitable breeding habitat away from turbine area.	Not significant	Low beneficial
Merlin	Not significant	Negligible	Heather management measures to enhance suitable breeding habitat away from turbine area.	Not significant	Low beneficial
Short-eared owl	Not significant	Negligible	Heather management measures to enhance suitable breeding habitat away from turbine area.	Not significant	Low beneficial

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/Adverse		Significance	Beneficial/Adverse
Curlew	Not significant	Low adverse	Peatland restoration to enhance suitable breeding habitat away from turbine area.	Not significant	Low beneficial
Golden plover	Not significant	Low adverse	Peatland restoration to enhance suitable breeding habitat away from turbine area.	Not significant	Low beneficial
During Operation: Collision risk					
Greylag goose	Not significant	Low adverse	None required	Not significant	Low adverse
Pink-footed goose	Not significant	Low adverse	None required	Not significant	Low adverse
Whooper swan	Not significant	Low adverse	None required	Not significant	Low adverse
Golden eagle	Not significant	Low adverse	None required	Not significant	Low adverse
Hen harrier	Not significant	Low adverse	Heather management measures to enhance suitable breeding habitat away from turbine area.	Not significant	Low adverse
Merlin	Not significant	Low adverse	Heather management measures to enhance suitable breeding habitat away from turbine area.	Not significant	Low adverse
Red kite	Not significant	Low adverse	None required	Not significant	Low adverse
Curlew	Not significant	Low adverse	None required	Not significant	Low adverse
Cumulative effects					
All IOFs	Not significant	Adverse	None required	Not significant	Adverse

7.13 References

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