8 Ornithology

8.1 Introduction

8.1.1 This Chapter describes and evaluates the current ornithological nature conservation interests in relation to the Proposed Development and Site. An assessment is then made in relation to any direct or indirect habitat loss and disturbance or displacement effects during construction, and the disturbance or displacement and collision risk effects during operation (including cumulatively). Only bird species above a certain conservation value have been assessed.

8.1.2 The ornithological baseline and the assessment have been completed by James Wilson (Principal Ecologist, Atmos Consulting Ltd.), an experienced ecologist with more than 20 years' experience respectively in ecology and ornithology, including both undertaking and managing ornithology surveys in support of predominantly mineral and wind farm developments. James has undertaken a number of impact assessments and produced EIA chapters for wind farms and other development types. He is experienced in the subject matter and in the species regularly encountered in the area in which the Proposed Development is located.

8.1.3 The chapter is supported by:

- **Technical Appendix 8.1: Ornithological Survey Report 2020 – 2023;**
- **Technical Appendix 8.2: Confidential Appendix;**
- **Technical Appendix 8.3: Shadow Habitats Regulations Appraisal (HRA);** and
- **Technical Appendix 8.4: Ornithological Modelling**.

8.2 Legislation, Policy and Guidance

8.2.1 Planning policies, legislation and guidance of relevance to this assessment are provided in the **Planning Statement**.

8.2.2 The legislation and policy pertinent to the ornithology within the context of the Proposed Development includes the following:

- Wildlife and Countryside Act 1981 (as amended);
- Conservation (Natural Habitats & c.) Regulations 1994 (as amended in Scotland);
- Nature Conservation (Scotland) Act 2004;
- Ramsar Convention on Wetlands;
- Biodiversity Action Plans; and
- Birds of Conservation Concern 5 ('BoCC')[1].

8.2.3 For full details of relevant legislation and policy documents please refer to Section 2 of **Technical Appendix 8.1**.

Ornithological Guidance and Information Sources

8.2.4 NatureScot (formerly Scottish Natural Heritage ('SNH')) has published a number of guidance documents related to the assessment of impacts of wind farms on bird populations. The following list, which includes both guidance from NatureScot and other guidance, was used to inform the ornithological assessment:

- Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action[2];
- Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Outwith Designated Areas[3];
- Assessing the Cumulative Impacts of Onshore Wind Energy Developments[4];
- Assessing Connectivity with Special Protection Areas[5];
- Environmental Statements and Annexes of Environmentally Sensitive Bird Information[6];
- Avoidance Rates for the Onshore SNH Bird Wind Farm Collision Risk Model[7];
- Recommended bird survey methods to inform impact assessment of onshore wind farms[8]; and
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine[9].

8.2.5 In addition, contextual data on avian populations was obtained from a number of publications, primarily the following:

- The Birds of Scotland[10]; and

[1] Stanbury, A. J., Eaton, M. A., Aebischer, N. J., Balmer, D., Brown, A. F., Douse, A., Lindley, P., McCulloch, N., Noble, D. G. and Win, I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723 – 747.
[2] SNH. (2000). Windfarms and Birds: Calculating a theoretical collision risk assuming no avoidance action. SNH, Battleby.
[3] SNH. (2006 Version 1) and (2018a Version 2). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Outwith Designated Areas. SNH, Battleby.
[4] SNH. (2012). Assessing the Cumulative Impacts of Onshore Wind Energy Developments. SNH, Battleby.
[5] SNH. (2016a). Assessing Connectivity with Special Protection Areas. SNH, Battleby.
[6] SNH. (2016b). Environmental Statements and Annexes of Environmentally Sensitive Bird Information. SNH, Battleby.
[7] SNH. (2017a). Avoidance Rates for the Onshore SNH Bird Wind Farm Collision Risk Model. SNH, Battleby.
[8] SNH. (2017b). Recommended bird survey methods to inform impact assessment of onshore wind farms. SNH, Battleby.
[9] Chartered Institute of Ecology and Environmental Management (CIEEM). (2022). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester.
[10] Forrester, R. W., Andrews, I. J., McInemy, C. J., Murray, R. D., McGowan, R. Y., Zonfrillo, B., Betts, M. W., Jardine, D. C. and Grundy, D. S. (eds). (2007). The Birds of Scotland. Scottish Ornithologists Club, Aberlady.

- Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022[11].

8.2.6 Data on bird populations was sought from the following sources to support the ornithological assessment:

- Royal Society for the Protection of Birds Scotland ('RSPB'); and
- Highland Raptor Study Group ('HRSG').

8.2.7 Information about designated sites was obtained by accessing the following online resources:

- NatureScot SiteLink website[12];
- MAGIC online GIS tool[13]; and
- Joint Nature Conservation Committee ('JNCC') website[14].

8.3 Consultation

8.3.1 Consultation has been undertaken with the Energy Consents Unit ('ECU') and The Highland Council ('THC') and statutory consultees (e.g. NatureScot) through the Environmental Impact Assessment ('EIA') Scoping process. The consultation responses are summarised in **Table 8.1**. It is noted that no scoping response was received from the Royal Society for the Protection of Birds ('RSPB').

Table 8.1: Consultee Responses Relating to Avian Ecology

Consultee	Responses Relevant to Avian Ecology	Comment
Energy Consents Unit (ECU) – Scoping – 14/05/2024.	"It is recommended by the Scottish Ministers that decisions on bird surveys – species, methodology, vantage points, viewsheds & duration - site specific & cumulative – should be made following discussion between the Company and NatureScot."	Methodology was developed using NS guidance (see section 8.2.4) and described in **TA 8.1 Ornithological Survey Report 2020-23**.
The Highland Council (THC) – Scoping – 01/05/2024.	"The presence of Schedule 1 Birds and/or European Protected Species must be included and considered as part of the planning application process; not as an issue that can be considered at a later stage. Any consent given without due consideration to these species may breach European Directives with the possibility of consequential delays or the project being halted by the EC. Please refer to any comments from NatureScot and RSPB in this respect."	Baseline survey information has been presented as Technical Appendices to the EIA Report (**TA 8.1: Ornithological Survey Report 2020 – 2023** and **TA 8.2: Confidential Appendix**). This includes information on Schedule 1 species, and impacts on those species have been fully assessed within the impact assessment. For any species not taken forward to assessment, an explanation is given as to why it is considered that there would be no significant adverse impact.
		Potential impacts of the Proposed Development on species and habitats has been addressed within **Chapter 7: Ecology**, and **Chapter 8: Ornithology** of the EIA Report.
	"An assessment of the impacts to birds through collision, disturbance, and displacement from foraging/breeding/roosting habitat will be required for both the proposed development site and cumulatively with other proposals. The EIAR should be clear on the survey methods and any deviations from guidance on ornithology matters."	Potential impacts of the Proposed Development on *avian* species has been addressed within **Chapter 8: Ornithology** of the EIA Report, specifically sections 8.8 and 8.9.
NatureScot – Scoping – 16/04/2024	"Based on the initial information provided in the Scoping Report we advise that the proposal raises the following key issues relevant to our interests: • … • Potential impacts to protected areas including the River Spey Special Area of Conservation (SAC), and the Kinveachy Forest SAC, Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI). • Potential for impacts, including cumulative impacts, to wider countryside birds including golden eagle, white-tailed eagle and red kite. • …"	Baseline survey information has been presented as Technical Appendices to the EIA Report **(TA 8.1: Ornithological Survey Report 2020 – 2023, TA 8.2: Confidential Appendix,** and **TA 8.3: Shadow Habitats Regulations Appraisal).** Potential impacts of the Proposed Development on species and habitats have been addressed within **Chapter 7: Ecology**, and **Chapter 8: Ornithology** of the EIA Report. Specifically, impacts on designated sites are considered in section 8.6 as well as **TA: 8.3 Shadow Habitats Regulations Appraisal**, while impacts on species have been addressed in section 8.8 and 8.9 and **TA 8.4 Ornithology Modelling** also provides additional information on potential impacts on golden eagle, white-tailed eagle and red kite.
NatureScot – Scoping – 16/04/2024	"2. Protected areas a. Kinveachy Forest Special Protection Area (SPA) and Special Area of Conservation The proposed development site is around 1km from the SPA which is protected for breeding capercaillie and crossbill. We advise that an assessment of the potential for disturbance, displacement, habitat loss or modification, and collision risk to capercaillie should be considered within a HRA, although our initial view is that construction related disturbance is likely to be the key consideration. We recommend the applicants contact the Capercaillie Project Officer Helen Gray to request capercaillie desk study records for this area and for advice on survey and assessment, including the extent of existing coverage so as to avoid any unnecessary	Data was obtained from the Capercaillie officer and is presented in **TA 8.2 Confidential Appendix**. A shadow HRA has been undertaken, the results of which are presented in **TA 8.3 Shadow Habitats Regulation Appraisal** which considers impacts on capercaillie.

[11] Challis, A., Beckmann, B. C., Wilson, M. W., Eaton, M. A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N. I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. British Trust for Ornithology (BTO) Scotland, Stirling.
[12] NatureScot. (2024). SiteLink: data and information on key protected areas across Scotland. Available at: https://sitelink.nature.scot/home.
[13] Department for Environment, Food & Rural Affairs (DEFRA). (2024). Multi-Agency Geographic Information for the Countryside. Available at: https://magic.defra.gov.uk.
[14] Joint Nature Conservation Committee (JNCC). (2024). Available at: https://jncc.gov.uk.

Consultee	Responses Relevant to Avian Ecology	Comment
	duplication and potential for disturbance. If the area is not currently surveyed then surveys will be required in line with our guidance at: ***https://www.nature.scot/doc/recommended-bird-survey-methods-to-inform-impact-assessment-onshore-windfarms*** and ***https://www.nature.scot/doc/guidance-licensing-capercaillie-survey-methods***. We would be happy to provide further advice at the applicant's request."	
NatureScot – Scoping – 16/04/2024	"c. Kinveachy Forest Site of Special Scientific Interest (SSSIs) The SSSI is protected for its breeding bird assemblage and native pinewood. The applicants refer to crested tit, capercaillie and Scottish crossbill in Table 8-1 [of the Scoping report] but should note that these are not the only assemblage species (we would be happy to advise further on this point). The SSSI boundary overlaps with the south of the proposed development site although the closest turbines, as currently mapped, are outside the SSSI. We advise that the final design and layout aims to avoid direct and indirect impacts to the SSSI interests. We would expect the EIAR to show that there will be no construction within the SSSI and that any construction works nearby can be managed to avoid indirect impacts such as increased erosion risk. The potential for changes to deer movements to affect the SSSI should also be considered. Survey and assessment should consider the potential for impacts to birds which are part of the SSSI breeding bird assemblage, either breeding within or using the SSSI. We provide further advice on the ornithological assessment below."	Baseline survey information has been presented as Technical Appendices to the EIA Report (**TA 8.1: Ornithological Survey Report 2020 – 2023, TA 8.2: Confidential Appendix**, and **TA 8.3: Shadow Habitats Regulations Appraisal**). Potential impacts of the Proposed Development on species and habitats have been addressed within **Chapter 7: Ecology**, and **Chapter 8: Ornithology** of the EIA Report.
NatureScot – Scoping – 16/04/2024	"4. Ornithology We have not yet seen full details of the survey methods, results and assessment, so cannot comment on the likely impacts of the proposal at this stage. Prior to submission of any future application we advise that the applicants ensure that survey and assessment has followed the guidance at: https://www.nature.scot/doc/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms. Where methods deviate from our guidance we would expect the EIAR to provide justification and demonstrate how this has not affected results."	NatureScot guidance was used to develop the survey programme. Where it was necessary to deviate from guidance (for example bad weather preventing access to vantage points for several months during one winter, these have been described in the limitations presented in **TA 8.1 Ornithological Survey Report 2020-2023** and effects on the ability to describe the baseline have been considered.
NatureScot – Scoping – 16/04/2024	"Given the activity levels recorded and changes to the site boundary we recommend that the applicants contact us for further pre-application advice on the ornithology assessment, particularly in relation to golden eagle, white-tailed eagle and red kite."	Noted. In addition to scoping, an additional request was made to NatureScot by email on the 7th August 2024 for cumulative wind farm data which would assist in assessing cumulative impacts on key species such as those listed but unfortunately the data was not available for public release.
	"The scoping report notes that, due to site design changes, surveys have been extended to include land in the south of the site. A year of vantage point survey work is proposed to cover this additional area. Table 9-12 [of the Scoping report] includes summary flight data for vantage points (VPs) 5-11. Although results for VP12 and 13 (for the south of the site) are not included, this initial information indicates that Collision Risk Modelling will be required for a number of species. The initial results show that the proposal has the potential to impact on the NHZ10 golden eagle, white-tailed eagle and red kite populations, either as an individual scheme or in combination with other developments in the area. We advise that two years of survey work is undertaken across the whole of the proposed development site in line with our guidance."	While we note that NatureScot advised two years of survey across the entire Site, given the understanding of the activity across the area (including large areas which are now completely outwith the turbine array of the Proposed Development) that one year would be sufficient in this area.
NatureScot – Scoping – 16/04/2024	"We advise that Collision Risk Modelling is tailored to the final turbine layout and that, if different parts of the site have been surveyed in different years, the applicants agree their suggested approach with us. [a] It would be helpful for the viewshed maps included in the EIAR to show the turbine locations so that coverage can be assessed." [b]	[a] Noted. [b] **Figure 8.2** shows the locations of all VPs (discontinued and current) and their viewsheds in relation to the design.
NatureScot – Scoping – 16/04/2024	"Mitigation options should be considered as part of the assessment process and it is recommended these details are included as part of any future application. We recommend that the design and layout aims to avoid impacts to eagles and red kite as far as possible. [a] We note that, depending on the collision risk estimates, Population Viability Assessments may be carried out to assist with assessment of impacts. We recommend that the applicants contact us to discuss their proposed approach to population modelling for golden eagle and white-tailed eagle. If the applicants are able to provide us with collision risk estimates for red kite we can advise whether population modelling might also be recommended for this species. The scoping report makes no mention of surveys for roosting raptors and we recommend that these are undertaken in accordance with our guidance." [b]	[a] Noted. [b] Baseline survey information has been presented as Technical Appendices to the EIA Report (**TA 8.1: Ornithological Survey Report 2020 – 2023, TA 8.2: Confidential Appendix** and **TA 8.4: Ornithological Modelling).** Potential impacts of the Proposed Development on avian species have been addressed within **Chapter 8: Ornithology** of the EIA Report. There was no evidence for any roosting raptors observed during fieldwork.

Consultee	Responses Relevant to Avian Ecology	Comment
	"This proposal also has the potential to impact on the NHZ10 golden eagle population, both as an individual scheme and in combination with other developments in the area, through displacement from foraging habitat. [a] We note and support the applicant's proposal to undertake GET (Golden Eagle Topographical) modelling. We recommend this tool is used to help with the assessment of impacts to golden eagles, including potential loss of foraging habitat. For further advice see: https://www.nature.scot/doc/naturescot-statement-modelling-support-assessment-forestry-and-windfarm-impacts-golden-eagles. We also wish to make the applicants aware of the Regional Golden Eagle Management Plan for NHZ10." [b]	[a] Noted. [b] Baseline survey information has been presented as Technical Appendices to the EIA Report **(TA 8.1: Ornithological Survey Report 2020 – 2023, TA 8.2: Confidential Appendix** and **TA 8.4: Ornithological Modelling).** Potential impacts of the Proposed Development on avian species have been addressed within **Chapter 8: Ornithology** of the EIA Report.
NatureScot – Scoping – 16/04/2024	"We note the applicant's intention to contact the RSPB and HRSG for current information from the proposed development site and appropriate buffers around it. [a] We advise that survey work and desk studies also cover access routes and any proposed habitat management areas. This will allow the potential for disturbance and displacement to be assessed, especially for Schedule 1 species, and any mitigation requirements to be identified." [b]	[a] Noted and to date, no response has been received from HRSG. Information was received from RSPB. [b] Baseline survey information has been presented as Technical Appendices to the EIA Report (**TA 8.1: Ornithological Survey Report 2020 – 2023** and **TA 8.2: Confidential Appendix**). Access routes were covered in survey areas. Potential impacts of the Proposed Development on avian species have been addressed within **Chapter 8: Ornithology** of the EIA Report.
NatureScot – Scoping – 16/04/2024	"Black grouse surveys have been completed but it is not clear if surveys have covered the revised site boundary and an appropriate buffer. We recommend that desk study results are also presented in the EIAR and an assessment of potential impacts included. If black grouse could be affected we would expect the EIAR to include information on the importance of any lek(s) in the local context, and to consider the potential for indirect effects due to changes to foraging and roosting habitat. We advise that a buffer of at least 500m is incorporated between any lek site and turbines to minimise the risk of displacement during operation."	The Site is unusual in that the original red line boundary was very much larger than the final turbine array; the site was fully surveyed, but there was no access outside this area for black grouse surveys. At the same time, due to the large extent of the red line boundary, this does include a large area which would be considered the 1.5km buffer to the access route and the turbine array. Baseline survey information has been presented as Technical Appendices to the EIA Report (**TA 8.1: Ornithological Survey Report 2020 – 2023** and **TA 8.2: Confidential Appendix**). Potential impacts of the Proposed Development on avian species have been addressed within **Chapter 8: Ornithology** of the EIA Report and specifically within section 8.8.
NatureScot – Scoping – 16/04/2024	"Once all survey work is complete an assessment of potential impacts through habitat loss/change, disturbance and/or displacement, and collision risk to SPA, SSSI and wider countryside bird populations will be required, both for the proposal on its own and in combination with other projects. [a] Assessments for wider countryside birds should follow NatureScot's guidance at: ***https://www.nature.scot/doc/guidance-assessing-significance-impacts-bird-populations-onshore-wind-farms-do-not-affect-protected***. [b] We advise that the cumulative assessment is carried out at the level of the relevant Natural Heritage Zone (NHZ10 Central Highlands for this proposal) or SPA population (see: ***https://www.nature.scot/doc/guidance-assessing-cumulative-impacts-onshore-wind-farms-birds***). [c] Depending on submission timescales we may be able to provide additional data to assist with the cumulative assessments, on request from the applicants. [d] Further information and advice on assessment of impacts to birds from wind farms (including collision risk modelling, SPA connectivity, effects of aviation lighting, etc) is available at: ***https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/onshore-wind-energy/wind-farm-impacts-birds***." [e]	[a] Potential impacts of the Proposed Development on avian species have been addressed within section 8.8. [b] Noted. [c] Cumulative assessments were carried out using NHZ populations. [d] Data was requested but was not available. [e] Noted.

8.4 Methodology

Field Survey

8.4.1 A detailed description of survey methods is provided in Section 3 of **Technical Appendix 8.1**. **Table 8.2** provides an overview of the surveys carried out. Data is presented in this EIA Report for the period September 2020 – August 2022 and January 2023 – December 2023.

Table 8.2: Summary of Ornithology Field Surveys

Survey	Non-Breeding Season 2020 / 2021	Breeding Season 2021	Non-Breeding Season 2021 - 2022	Breeding Season 2022	Non-Breeding Season 2022 / 2023 (part)	Breeding Season 2023	Non-Breeding Season 2023 / 2024 (part)
Vantage Point (VP) Surveys (7 VPs, an average of 6 hours per month per VP)	X	X	X	X			
Breeding Bird Surveys (using Brown & Shepherd methodology (Brown & Shepherd, 1993))[15]		X		X		X[a]	
Breeding Raptor Surveys		X		X		X[a]	
Vantage Point (VP) Surveys (2 VPs, an average of 6 hours per month per VP)					X	X	X

[a] – On the south-eastern area of the Site

Collision Risk Modelling

8.4.2 Collision Risk Modelling ('CRM') was carried out for the following species that showed sufficient levels of flight activity over the Site during the survey period. This decision is made based on the observed activity levels and the sensitivity of the species.

- curlew *Numenius arquata*;
- golden eagle *Aquila chrysaetos*;
- golden plover *Pluvialis apricaria*;
- greylag goose *Anser anser*;
- hen harrier *Circus cyaneus*;
- lapwing *Vanellus vanellus*;
- peregrine *Falco peregrinus*;
- pink-footed goose *Anser brachyrhynchus*;
- red kite *Milvus milvus*; and
- white-tailed eagle *Haliaeetus albicilla*.

8.4.3 While VP surveys were conducted over a wide area to accommodate all possible design iterations, reporting and assessment is based on those VP locations that overlook the final design turbine envelope (specifically VPs 8, 9, 10, 12 and 13).

8.4.4 To account for the variability in the duration of surveys (i.e. September 2020 to August 2022, and then January to December 2023), two CRM models were utilised. The first used flight data recorded from VPs 8 – 10 and the data recorded between September 2020 – August 2022), and the second used flight data recorded from VPs 12 and 13 and data recorded between January – December 2023. The results of the two models were then summed to produce an overall collision risk estimate for each species for the Site.

8.4.5 A model (Forsythe *et al.*, 1995)[16] was used to calculate the daytime length as a function of latitude (57° 17' 1" N for the centre of the Site) and date (2020 and 2023). **Table 8.3** and **Table 8.4** present the turbine parameters used for the CRM.

Table 8.3: Turbine Parameters (Data from September 2020 – August 2022 and VPS 8-10)

Turbine Parameter	Value
Number of Turbines	18
Blades per Turbine	3
Hub Height (m)	119
Rotor radius (m)	81

[15] Brown, A. F. and Shepherd, K. B. (1993). A method for censusing upland breeding waders. Bird Study, 40:3, 189-195.

[16] Forsythe, W. C., Rykiel, E. J., Stahl, R. S., Wu, H. and Schoolfield, R. M. (1995). A model comparison for daylength as a function of latitude and day of year. Ecological Modelling Vol. 80, Issue 1, 87-95.

Maximum Chord (m)	4.6
Pitch (degrees)	15
Rotation Period (seconds)	4
Proportion Operational	0.85

Table 8.4: Turbine Parameters (Data from January – December 2023 and VPs 12-13)

Turbine Parameter	Value
Number of Turbines	12
Blades per Turbine	3
Hub Height (m)	119
Rotor radius (m)	81
Maximum Chord (m)	4.6
Pitch (degrees)	15
Rotation Period (seconds)	4
Proportion Operational	0.85

8.4.6 The general methodology used to predict collision risk for birds using the wind farm airspace is provided by NatureScot (SNH, 2000)[17].

8.4.7 The random CRM was used for all species as they exhibit more random flight patterns as opposed to regular linear flight paths.

8.4.8 In summary, the following steps were followed for random bird movements in this assessment:

- digitise all flight lines and record relevant characteristics (including species, number of birds, start time of flight and time within each height band) in a database;
- review the flight line data, which in this instance indicated that a random collision analysis should be conducted for each species;
- identify all flights for each species that are at any point within the "at risk" height band and sum the total "at risk" flight duration for each VP, multiplying any flight at risk time by the number of birds observed, where more than one bird is recorded per flight line;
- calculate an "occupancy rate" for each VP, defined as the observed "at risk" activity levels divided by total observation time and area observed, giving the occupancy per unit time of the unit area for each VP;
- average the occupancy rate across the VPs using an un-weighted mean approach;
- apply the average occupancy rate to the Site, based on the Site area, risk volume and total turbine rotor volume, applying a factor to estimate the total time that the birds could theoretically be active during the year, based on an algorithm for calculating day length (Forsythe *et al.*, 1995)[18], thus determining the total predicted time spent by the individual species within air space that could be swept by turbine blades;
- run the collision model with relevant turbine and ornithological parameters to calculate the theoretical probability of transits resulting in a collision assuming no avoidance action; and
- multiply the number of transits by the collision rate, avoidance factor and operating parameters of the proposed wind farm to estimate the theoretical number of collisions per year.

8.4.9 Avoidance rates used were in accordance with current NatureScot guidance on default values (SNH, 2017a)[19].

8.4.10 The predicted mortality through collision is dependent on a number of variables, including flight activity within the final design turbine envelope, the species' physiology, nocturnal flight behaviour and flight velocity, weather conditions, the predicted avoidance rate, the number, rotational speed and dimensions of the turbines, and the proportion of the time that the turbines are operational throughout the year.

8.4.11 The following assumptions were made for the species included for CRM:

- a daylight calculator was used to produce figures for the total daylight period at the Site;
- biometric data (bird length and wingspan) for the various species was obtained from the BTO webpage[20]; and
- flight speed data taken from Alerstam *et al.* (2007)[21].

[17] SNH. (2000). Windfarms and Birds: Calculating a theoretical collision risk assuming no avoidance action. SNH, Battleby.
[18] Forsythe, W. C., Rykiel, E. J., Stahl, R. S., Wu, H. and Schoolfield, R. M. (1995). A model comparison for daylength as a function of latitude and day of year. Ecological Modelling Vol. 80, Issue 1, 87-95.
[19] SNH. (2017a). Avoidance Rates for the Onshore SNH Bird Wind Farm Collision Risk Model. SNH, Battleby.
[20] British Trust for Ornithology (BTO). (2024). Available at: https://www.bto.org.
[21] Alerstam, T., Rosen, M., Backman, J., Ericson, P. G. P. and Hellgren, O. (2007). Flight speeds among bird species: allometric and phylogenetic effects. PLoS Biology e197.

Assessment Methods

8.4.12 The Chartered Institute of Ecology and Environmental Management ('CIEEM') Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2022)[22] (henceforth referred to as the 'CIEEM guidelines') form the basis of the impact assessment presented in this chapter. These guidelines set out a process of identifying the value of each ornithological receptor and then characterising the "impacts" that are predicted, before discussing the "effects" on the integrity or conservation status of the receptor, proposed mitigation and residual effects.

8.4.13 The initial action for assessment of impacts is to determine which features should be subject to detailed assessment. The ornithological receptors to be the subject of more detailed assessment should be of sufficient value that impacts upon them may be significant in terms of either legislation or policy. The receptors should also be vulnerable to significant effects arising from the Proposed Development.

8.4.14 All designated nature conservation sites, bird species and communities that occur within the "zone of impact" of the Proposed Development are defined as potential ornithological features.

Determining Value

8.4.15 The CIEEM guidelines recommend that the value of ornithological features is determined based on a geographic frame of reference. For this Proposed Development, the following geographic frame of reference is used:

- international (nature conservation designation, habitat or populations of species of international importance, e.g. a Special Protection Area (SPA) or significant numbers of a designated population outside the designated site);
- national (nature conservation designation, habitat or populations of species of Scottish importance, e.g. a Site of Special Scientific Interest (SSSI) or a National Nature Reserve (NNR), a nationally important population / assemblage of a species listed on Schedule 1 of the Wildlife and Countryside Act 1981('WCA') or Annex 1 of the Birds Directive);
- regional (a regionally (i.e. within the Natural Heritage Zone (NHZ)) important population of birds which have a high conservation value (e.g. Schedule 1, Annex 1, Scottish Biodiversity List (SBL) or Birds of Conservation Concern (BoCC) amber or red species);
- county (i.e. Inverness-shire) (a population of high conservation birds which represent an important part of the county population of that species);
- local (i.e. within 5km) (a population of any species which is important at the local level); and
- less than local (a population of birds which has little or no intrinsic nature conservation value).

Valuing Species

8.4.16 In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Rarity is an important consideration because of its relationship with threat and vulnerability although, because some species are inherently rare, it is necessary to look at rarity in the context of status. A species that is rare and declining should be assigned a higher level of importance than one that is rare with a stable population. Reference is made to a number of categorisations of ornithology conservation status, including:

- **Annex 1:** Annex 1 of Directive 209/147/EC on the conservation of wild birds (the Birds Directive) lists species that are of conservation importance at a European level;
- **Schedule 1:** Rare breeding species in the UK, and / or species under threat of human persecution are listed on Schedule 1 of the WCA, which provides additional legal protection for such species at or around their nests;
- **Schedule 1A:** Certain Schedule 1 species are also listed on Schedule 1A of the WCA, which protects them from harassment all year round;
- **Schedule A1:** Certain Schedule 1 species are also listed on Schedule A1 of the WCA, which protects their nests all year round;
- **UK Birds of Conservation Concern (BoCC):** A national classification that categorises breeding bird populations in the UK using a traffic light system to indicate an increasing level of conservation concern. Species are assessed against objective criteria such as population and distribution trends; those that have a declining range and / or population, or that are vulnerable to population effects due to their small population size are categorised as Red or Amber listed species, depending on the extent of the decline or vulnerability;
- **Scottish Biodiversity List (SBL):** Species which are identified as being important from a conservation viewpoint within a Scottish context are listed on the SBL; and

[22] Chartered Institute of Ecology and Environmental Management (CIEEM). (2022). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester.

Local Biodiversity Action Plan (LBAP): Operates at a local authority level and identifies priority habitats and species for which conservation / enhancement measures are underway or planned.

Predicting and Characterising Impacts

8.4.17 In accordance with the CIEEM guidelines, when describing impacts, reference is made to the following, where appropriate:

- confidence in predictions – the level of certainty than an impact will occur as predicted, based on professional judgement and, where possible, evidence from other schemes – this is based on a four point scale: certain / near certain; probable; unlikely; and extremely unlikely;
- magnitude – the size of an impact in quantitative terms where possible;
- extent – the area over which an impact occurs;
- duration – the time for which an impact is expected to last;
- reversibility – a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible; and
- timing and frequency – i.e. whether impacts occur during critical life stages or seasons.

8.4.18 Both direct and indirect impacts are considered. Direct ornithological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ornithological impacts are attributable to an action which affects ornithological resources through effects on an intermediary ecosystem, process or receptor.

Significance Criteria

8.4.19 The CIEEM guidelines define a significant effect as "an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general". Significant effects can be either beneficial or adverse, and are qualified with reference to an appropriate geographic scale, from international to local. It should be noted that the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species which appears on a national list of species of principal importance for biodiversity in a specific area may not have an effect on its national population.

8.4.20 The approach adopted here aims to determine an effect to be significant or not on the basis of a discussion of the factors that characterise it, i.e. the ornithological significance of an effect is not dependent on the value of the feature in question. The value of a feature that will be significantly affected is used to determine the geographical scale at which the effect is significant, e.g. an ornithologically significant effect on a feature of local importance would be considered to represent a significant effect at a local area level. This in turn is used to determine the implications in terms of legislation, policy and / or development control.

8.4.21 Any significant effects remaining after mitigation (the residual effects), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development control when determining the planning application.

Mitigation, Compensation and Enhancement

8.4.22 It is important as part of any EIA, wherever possible, to clearly differentiate between mitigation, compensation and enhancement, and these terms are defined here as follows:

- mitigation is used to refer to measures to avoid, reduce or remedy a specific negative impact in situ. Mitigation is only required for negative impacts assessed as being significant or where required to ensure compliance with legislation;
- compensation is used to refer to measures proposed in relation to specific negative impacts but where it is not possible to fully mitigate for negative impacts in situ. Compensation is only required for negative impacts assessed as being significant or where required to ensure compliance with legislation; and
- enhancement is used to refer to measures that will result in positive ornithological impacts, but which do not relate to either specific significant negative impacts or where measures are required to ensure legal compliance.

Assessment Areas

8.4.23 The bird surveys cover a wide area, so impacts have been assessed within the zone of impact appropriate for each receptor. Additionally, the search area for historic data was larger again and this has been used to inform the understanding of the wider area for key species.

8.5 Baseline Results

8.5.1 The results of each ornithological survey are presented within **Technical Appendices 8.1: Ornithological Surveys 2020 – 2023** and **8.2: Confidential Appendix**. This section provides an assessment of the ornithological receptors found on Site, and in the vicinity of the Site, and assesses their value in the context of the Proposed Development.

Designated Sites

8.5.2 As described in Section 4.1.1 of **Technical Appendix 8.1** and shown on **Figure 8.1**, two designated sites with avian qualifying features were identified within 10km of the Site (increased to 20km for Natura 2000 sites with qualifying interests for geese) (**Table 8.5** refers). There were no sites for geese designated within the band of 10km – 20km.

Table 8.5: Designated Sites within 10km of the Site

Site Name	Designation	Distance from Site boundary	Qualifying feature (latest assessed condition)	Conservation value
Kinveachy Forest	SPA	c. 0.65km to the south-east	Under Article 4.1 of the Birds Directive – Breeding[23]: • Capercaillie Tetrao urogallus (Favourable maintained 15 May 2008) • Scottish crossbill *Loxia scotica* (Favourable maintained 27 March 2012)	International
Loch Vaa	SPA	c. 8.9km to the south-east	Under Article 4.1 of the Birds Directive- Breeding[24]: • Slavonian grebe *Podiceps auritus* (Unfavourable no change 30 June 2007)	International
Kinveachy Forest	SSSI	Partial overlap with the south-eastern edge of the Site boundary	• Breeding bird assemblage – the only species listed in the assemblage on the citation[25] are those listed below Species listed on the citation[26]: • Capercaillie • Scottish crossbill • Crested tit Lophophanes cristatus (Favourable maintained 8 June 2007)	National
Loch Vaa	SSSI	c. 8.9km to the south-east	Species listed on the citation[27]: • Goldeneye Bucephala clangula (Unfavourable no change 30 June 2007) • Slavonian grebe (Unfavourable no change 30 June 2007)	National
Kinveachy Forest	Important Bird Area (IBA)	c. 0.65km to the south-east	The site is notable for breeding pinewood species such as capercaillie, Scottish crossbill and crested tit[28].	Regional

8.5.3 The boundary of the Site does slightly overlap the Kinveachy Forest SSSI site in the south-east. No turbines or infrastructure will be located in this area and there will be no oversail.

Species

Curlew

8.5.4 Curlew are an SBL species, red-listed on BoCC 5, and are considered to be at risk from wind farms (SNH, 2018a)[29]. Declines of up to 40% have been recorded in breeding populations within about 650m of wind farms (Pearce-Higgins, 2012)[30].

8.5.5 The population estimate for NHZ 10 is estimated at 811 breeding pairs, and 249 and 385 breeding pairs respectively for NHZ 7 and 21 (Wilson, 2015)[31], although this species is undergoing a decline in population across the UK.

8.5.6 **Table 8.6** shows the flight activity recorded during the VP surveys. They were only present in the breeding season, with no activity on the southern section of the Proposed Development.

Table 8.6: Results of VP Surveys for Curlew

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Curlew (Numenius Arquata)	September 2020 – February 2021					
	March 2021 – August 2021	1	2	8	258	136
	September 2021 – February 2022					
	March 2022 – August 2022	1	2	18	1,673	1,604

[23] NatureScot SiteLink. (2024). Available at: https://sitelink.nature.scot/site/8519.
[24] NatureScot SiteLink. (2024). Available at: https://sitelink.nature.scot/site/8541.
[25] NatureScot SiteLink. (2024). Available at: https://sitelink.nature.scot/site/864.
[26] NatureScot SiteLink. (2024). Available at: https://sitelink.nature.scot/site/864.
[27] NatureScot SiteLink. (2024). Available at: https://sitelink.nature.scot/site/1065.
[28] BirdLife International. (2024). Important Bird Area factsheet: Kinveachy Forest (United Kingdom). Available at: https://datazone.birdlife.org/site/factsheet/kinveachy-forest-iba-united-kingdom.
[29] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[30] Pearce-Higgins, J. W., Stephen, L., Douse, A. and Langston, R. H. W. (2012). Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology.
[31] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.

January 2023 – February 2023					
March 2023 – August 2023					
September 2023 – December 2023					

8.5.7 No confirmed territories were identified within the Site, with 22 possible territories identified in 2021 (the majority within the Site boundary), 17 probable and 28 possible identified in 2022, and no territories identified in the smaller area in 2023 (indicated in **Figures 8.3 – 8.5**).

8.5.8 Of these, two possible territories were within 1,000m of turbine locations in 2021 and two probable and nine possible territories were within 1,000m of turbine locations in 2022.

8.5.9 The number of birds recorded and potentially breeding is relatively small given the NHZ population estimate and the widespread occurrence of the species across the county. As such, the importance of the Site to curlew is assessed as local.

Golden Eagle

8.5.10 Golden eagle are an Annex I / Schedule 1 / SBL species, are green-listed on BoCC 5, and are considered to be at risk from wind farms (SNH, 2018a)[32]. The level of legal protection for golden eagle is due to historic and current levels of persecution and because of the relatively small national population.

8.5.11 The population estimate for NHZ 10 is estimated at 12 occupied breeding territories, and 43 and 0 occupied breeding territories respectively for NHZ 7 and 21 (Wilson, 2015)[33]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[34] has 17 occupied territories out of 21 checked in the Inverness-shire area in 2022.

8.5.12 While this species was not recorded as breeding within the Site, flight activity was recorded during the VP surveys together with observations recorded during the breeding bird and raptor surveys in the study area.

8.5.13 **Table 8.7** shows the flight activity recorded during the VP surveys. The table shows that there has been a consistency of use of the Site by this species throughout the different survey seasons.

Table 8.7: Results of VP Surveys for Golden Eagle

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Golden eagle (Aquila chrysaetos)	September 2020 – February 2021	1	1	3	124	93
	March 2021 – August 2021	1	2	13	1,957	1,587
	September 2021 – February 2022	1	2	10	1,708	1,263
	March 2022 – August 2022	1	2	11	2,629	2,605
	January 2023 – February 2023	1	1	1	67	67
	March 2023 – August 2023	1	1	2	204	196
	September 2023 – December 2023	1	1	1	50	50

8.5.14 There was no evidence of golden eagle breeding on or within the immediate vicinity of the Site. There was no breeding activity or an active eyrie recorded within the survey area.

8.5.15 Golden eagle are considered to have an intrinsic value of national given the small localised population and the conservation classifications of the species. Use of the Site was observed, with evidence of ranging / foraging flights but no signs of breeding. However, the Site could be used by birds breeding within 6km of the Proposed Development. Consequently the Site is considered to be of regional importance for the species as a result of the level of recorded use and the potential to be used by one or more pairs.

Golden Plover

8.5.16 Golden plover are listed on Annex 1 of the EU Birds Directive, are an SBL species and are green-listed on BoCC. They are considered to be at risk from wind farms (SNH, 2018a)[35].

[32] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[33] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[34] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.
[35] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.

8.5.17 The population estimate for NHZ 10 is estimated at 2,702 breeding pairs, and 3,009 and 94 breeding pairs respectively for NHZ 7 and 21 (Wilson, 2015)[36].

8.5.18 **Table 8.8** shows the flight activity recorded during the VP surveys. They were only present during the breeding season.

Table 8.8: Results of VP Surveys for Golden Plover

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Golden plover (Pluvialis apricaria)	September 2020 – February 2021					
	March 2021 – August 2021	1	3	6	154	95
	September 2021 – February 2022					
	March 2022 – August 2022	1	1	3	12	0
	January 2023 – February 2023					
	March 2023 – August 2023	1	3	8	156	114
	September 2023 – December 2023					

8.5.19 One confirmed territory was confirmed located on the slopes of Carn Coire na Cluanaich (north-east of Turbine 12) during breeding bird surveys in 2022.

8.5.20 In addition, three probable and seven possible territories were identified in 2021, 14 probable, and 14 possible territories were identified in 2022, and one probable and four possible territories were identified in 2023 (**Figures 8.3 – 8.5** refer).

8.5.21 Of these territories, in 2021, there were two probable and six possible territories within 1,000m of turbine locations. In 2022 there was one confirmed, five probable and six possible within 1,000m of turbine locations. In 2023, there was one probable and four possible territories within 1,000m of turbine locations, but in the reduced area surveyed that year.

8.5.22 Golden plover are a sensitive conservation species due to their inclusion on Annex 1 of the Birds Directive. There was a relatively high population across the Site, with a large proportion of those being within 1,000m of turbine locations. But the NHZ populations are also large in a Scottish context.

8.5.23 Therefore, when the numbers of birds observed are assessed against the greater NHZ population, the Site is considered to be of local importance for the species.

Greylag Goose

8.5.24 Greylag goose in this area are not included among those which are listed on Schedule 1 of the WCA; as such the species in this region does not have special protection under the WCA. Greylag goose are amber-listed on BoCC 5 and are considered to be at risk from wind farms (SNH, 2018a)[37].

8.5.25 There is both a naturalised, resident population in the UK as well as a large number of international migrants which arrive from the Arctic to overwinter in the UK.

8.5.26 Wintering populations of greylag goose are a qualifying feature of the Inner Moray Firth SPA, but given the distance between the Proposed Development and the SPA at approximately 22km, greylag goose observed on and around the Site will not form part of the SPA population.

8.5.27 No NHZ population estimate exists, but Mitchell *et al.* (2011)[38] provides a Scottish wintering population estimate of 47,405 based on surveys undertaken in 2008 and 2009. A sensitivity mapping study of the distribution of the Icelandic wintering population of Greylag geese (Mitchell, 2012)[39] showed an absence of birds in winter from the NHZ area.

8.5.28 **Table 8.9** shows the flight activity recorded during the VP surveys. Birds were observed all year, suggesting both migratory and naturalised birds were recorded. However, the maximum size of a flock being 255 birds is indicative that there were migratory birds present.

Table 8.9: Results of VP Surveys for Greylag Goose

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Greylag goose (Anser anser)	September 2020 – February 2021	8	67	5	15,993	2,742
	March 2021 – August 2021	2	255	22	145,894	50,670
	September 2021 – February 2022	1	33	2	2,392	115

[36] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[37] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[38] Mitchell, C., Griffin, L., Trinder, M., Neweth, J., & Urquhart, C. (2011). The status and distribution of summering Greylag Geese *Anser anser* in Scotland 2008–09. Bird Study 58.
[39] Mitchell, C. (2012). Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge. 108pp.

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
	March 2022 – August 2022	14	14	1	924	924
	January 2023 – February 2023					
	March 2023 – August 2023					
	September 2023 – December 2023	35	35	1	4,305	4,305

8.5.29 One confirmed territory was confirmed located in the far east of the Site during breeding bird surveys in 2021, and two were recorded located on the slopes of Cnocan Dubh overlooking Easter Strathnoon during breeding bird surveys in 2022. In addition, one probable and one possible territory were identified in 2022, with no territories identified in 2023 (**Figures 8.3 – 8.5** refer).

8.5.30 While a small number of birds were recorded using the boundary habitat of the Site, the Proposed Development does occupy a location which geese can fly over – either on migration (which is likely given the timing of the majority of flights), as feeding movements from localised roosts and local birds moving around the area.

8.5.31 The majority of flights were likely to be of birds passing over on migration which happened to cross the Proposed Development. The numbers involved are not at a level to be considered either nationally or internationally important in their own right and they do not constitute part of a nationally or internationally designated population. As such, the Proposed Development was of little or no value to these birds and so the value is assessed as being of less than local.

8.5.32 However, as a small number of birds were observed using the Site, overall the Site is considered to be of local importance for the species as a result of the level of recorded use.

Hen Harrier

8.5.33 Hen harrier are listed on Annex 1 of the Birds Directive, and Schedules 1 and 1A of the WCA. This means that not only are they protected from injury or killing, they are protected from disturbance around their nest, their nests and dependent young have special protection from disturbance while they have an active nest, but they are also protected from reckless and / or intentional harassment at all times.

8.5.34 They are also an SBL species, are red-listed on BoCC 5, and are considered to be at risk from wind farms (SNH, 2018a)[40].

8.5.35 The population for NHZ 10 is estimated at 18 breeding pairs, and one breeding pair respectively for NHZ 7 and 21 (Wilson, 2015)[41]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[42] has zero occupied territories out of seven checked in the Inverness-shire area in 2022.

8.5.36 While this species was not recorded as breeding within the Site, flight activity was recorded during the VP surveys together with observations recorded during the breeding raptor surveys in the study area.

8.5.37 **Table 8.10** shows the flight activity recorded during the VP surveys. There was slightly more activity recorded during the breeding seasons which could be due to the occurrence of the species in the region being greater during the breeding season as most territory holding birds will move away to lower altitudes in the non-breeding season as availability of prey decreases.

Table 8.10: Results of VP Surveys for Hen Harrier

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Hen harrier (Circus cyaneus)	September 2020 – February 2021	1	1	1	34	10
	March 2021 – August 2021	1	1	4	495	416
	September 2021 – February 2022	1	1	1	17	0
	March 2022 – August 2022	1	2	2	93	68
	January 2023 – February 2023					
	March 2023 – August 2023					
	September 2023 – December 2023					

8.5.38 There was no evidence of breeding territories identified within the Site with all activity attributed to wide-ranging foraging behaviour. With relatively few flights and no evidence of breeding, the Site is considered to have less than local importance for the species.

[40] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[41] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[42] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.

Lapwing

8.5.39 Lapwing are an SBL species, red-listed on BoCC 5, and are considered to be at risk from wind farms (SNH, 2018a)[43].

8.5.40 No NHZ population estimate exists, but the most recent population estimate for Scotland is 58,800 pairs (Foster *et al.*, 2013)[44].

8.5.41 **Table 8.11** shows the flight activity recorded during the VP surveys. The species was only recorded during the breeding season.

Table 8.11: Results of VP Surveys for Lapwing

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Lapwing (Vanellus vanellus)	September 2020 – February 2021					
	March 2021 – August 2021	1	2	9	843	470
	September 2021 – February 2022					
	March 2022 – August 2022	1	2	4	69	48
	January 2023 – February 2023					
	March 2023 – August 2023					
	September 2023 – December 2023					

8.5.42 One probable and six possible territories were identified in 2021 (the majority within the Site), one confirmed (on the slopes of Tom Liath), seven probable and six possible territories identified in 2022, and no territories identified in 2023 (**Figures 8.3 – 8.5** refer).

8.5.43 However, all territories were in the northern part of the Site and there were no territories within 1,000m of turbine locations.

8.5.44 The number of identified territories within the Site is relatively low when compared with the regional and county populations. The movement of birds across the Site increases the population size which could potentially be affected by the Proposed Development so the conservation value of the Site is assigned as less than local.

Merlin

8.5.45 Merlin are listed on Annex 1 of the EU Birds Directive, and Schedule 1 of the WCA 1981, and are on the SBL. They are also a red-listed species on BoCC 5, and are considered to be at risk from wind farms (SNH, 2018a)[45].

8.5.46 The population estimate for NHZ 10 is estimated at 13 breeding pairs, and 30 and zero breeding pairs respectively for NHZ 7 and 21 (Wilson, 2015)[46]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[47] has three occupied territories out of six checked in the Inverness-shire area in 2022.

8.5.47 No flight data for this species was recorded from those VP locations whose viewsheds incorporated the turbine array. Therefore collision risk modelling on this species was not undertaken.

8.5.48 However, a small number of flights were recorded around the approximate centre of the Site (**Figure 8.1.8a** and **Figure 8.1.9**, **Technical Appendix 8.1** refers) at below collision risk height.

8.5.49 The species was recorded during breeding raptor surveys in 2021 (outwith the Site boundary to the north-east) and in 2022 (around the approximate centre of the Site) with a level of recorded activity suggesting a currently occupied territory.

8.5.50 Merlin are a sensitive conservation species due to their inclusion on Annex 1 of the Birds Directive and are considered to have an intrinsic value of national. However, although there was some use of the Site observed, the relatively limited numbers observed suggests that the Site is not of great importance for the local population and is used by birds ranging in the wider area or non-territory holding birds. The Site is considered to be of local importance for the species as a result of the level of recorded use.

[43] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[44] Foster, S., Harrison, P., Buckland, S., Elston, D., Brewer, M., Johnston, A., Pearce-Higgins, J. and Marrs, S. (2013). Trends of Breeding Farmland Birds in Scotland. Trend Note 022. NatureScot, Battleby.
[45] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[46] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[47] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.

Peregrine

8.5.51 Peregrine are listed on Annex 1 of the EU Birds Directive and Schedule 1 of the WCA 1981. They are also an SBL species, are green-listed on BoCC 5, and are considered to be at risk from wind farms (SNH, 2018a)[48].

8.5.52 The population estimate for NHZ 10 is estimated at seven breeding pairs, and 15 and six breeding pairs respectively for NHZ 7 and 21 (Wilson, 2015)[49]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[50] has three occupied territories out of 17 checked in the Inverness-shire area in 2022.

8.5.53 While this species was not recorded as breeding within the Site, flight activity was recorded during the VP surveys together with observations recorded during the breeding raptor surveys in the study area.

8.5.54 **Table 8.12** shows the flight activity recorded during the VP surveys.

Table 8.12: Results of VP Surveys for Peregrine

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Peregrine (Falco peregrinus)	September 2020 – February 2021	1	1	2	271	271
	March 2021 – August 2021					
	September 2021 – February 2022	1	1	2	91	84
	March 2022 – August 2022					
	January 2023 – February 2023					
	March 2023 – August 2023					
	September 2023 – December 2023					

8.5.55 No peregrine were recorded breeding on the Site, and all records were from VP and breeding raptor surveys.

8.5.56 The current usage of the Site is very limited, suggesting that the Site only forms part of the foraging resource for this species and is only used very intermittently. They are generally a nationally important species, but given the limited use of the Site, the Site is considered to be of less than local importance to this species.

Pink-footed Goose

8.5.57 Pink-footed goose are amber-listed on BoCC 5 and are considered to be at risk from wind farms (SNH, 2018a)[51].

8.5.58 For NHZ 10, the peak count is estimated at seven (Wilson, 2015)[52]; for NHZs 7 and 21 the peak count is four and 35,370 respectively. A sensitivity mapping study of the distribution of pink-footed goose (Mitchell, 2012)[53] showed an absence of birds in winter from the NHZ area.

8.5.59 Pink-footed goose only breed in the UK in very small numbers, generally as migrants which have failed to return to their Arctic breeding grounds. As such, all records relate to non-breeding individuals, even if they were recorded in the breeding season.

8.5.60 All records of pink-footed goose relate to birds flying over the Site and there was no usage (i.e. birds foraging or resting) of the Site itself. All records came from the migration period and given the altitude observed, with a large proportion of the activity occurring above Band B, were likely to be from birds making longer distance movements, potentially migrating.

8.5.61 **Table 8.13** shows the flight activity recorded during the VP surveys.

Table 8.13: Results of VP Surveys for Pink-footed Goose

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Pink-footed goose (Anser brachyrhynchus)	September 2020 – February 2021					
	March 2021 – August 2021	6	6	1	54	54
	September 2021 – February 2022	6	450	18	248,542	127,622
	March 2022 – August 2022	73	73	1	9,709	0
	January 2023 – February 2023					

[48] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[49] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[50] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.
[51] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[52] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[53] Mitchell, C. (2012). Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge. 108pp.

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
	March 2023 – August 2023					
	September 2023 – December 2023					

8.5.62 There was no use of the Site, but it does occupy a location which geese can fly over – either on migration (which is likely given the timing of the greatest flight activity) or as feeding movements from roosts although there are no known large roosts within commuting range. The numbers involved are not at a level to be considered either nationally or internationally important in their own right and they do not constitute part of a nationally or internationally designated population. As such, given the lack of relationship with the Site, and taking into account the status and number of birds overflying , the Site would be considered of less than local importance.

Red Kite

8.5.63 Red kite are listed in Annex 1 of the EU Birds Directive and Schedule 1 of the WCA 1981. They are also an SBL species, are green-listed on BoCC 5, and are considered to be at risk from wind farms (SNH, 2018a)[54]. The level of legal protection for red kite is due to historic and current levels of persecution.

8.5.64 The population estimate for NHZ 10 is estimated at zero breeding pairs, and nine and 50 breeding pairs respectively for NHZ 7 and 21 (Wilson, 2015)[55]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[56] has 11 occupied territories out of 15 checked in the Inverness-shire area in 2022 and 2 pairs in Badenoch and Strathspey. This is likely to be an underestimate given the spread of the species.

8.5.65 A maximum of three territories were recorded in any year. More details are provided in **Technical Appendix 8.2: Confidential Appendix**. No nesting locations were confirmed; there were two possible territories recorded and one probable territory. The probable territory was recorded in both 2021 and 2022; however, no nesting location was confirmed, and the territory was identified primarily on the level of activity in a small area. This could be driven by the locale being a regular thermalling point for the local population, however from a precautionary basis, a territory has been assigned.

8.5.66 **Table 8.14** shows the flight activity recorded during the VP surveys.

Table 8.14: Results of VP Surveys for Red Kite

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Red kite (Milvus milvus)	September 2020 – February 2021	1	3	42	3,445	2,740
	March 2021 – August 2021	1	2	39	5,190	4,588
	September 2021 – February 2022	1	5	22	2,395	2,253
	March 2022 – August 2022	1	5	24	3,729	3,172
	January 2023 – February 2023	1	1	2	84	84
	March 2023 – August 2023	1	2	6	1,065	461
	September 2023 – December 2023	1	2	4	930	885

8.5.67 Given the number of territories involved and the activity observed over the Site, it is considered to be of county importance to the species.

Short-eared owl

8.5.68 Short-eared owl are an Annex I SBL species are amber listed on BoCC 5 and are considered to be at risk from wind farms.

8.5.69 The population estimate for NHZ 10 is estimated at zero territorial pairs, and three and zero territorial pairs respectively for NHZ 7 and 21 (Wilson, 2015)[57]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[58] has two occupied territories in Badenoch & Strathspey in 2021 (as well as two other single territory holding birds) and one territory in Nairn and no

[54] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[55] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[56] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.
[57] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[58] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.

territories at all located in 2022. This is typical of short-eared owl which only breed in years when the vole populations are high and then do not breed in other years.

8.5.70 In 2021 there were a number of observations of short-eared owl during breeding raptor surveys in the centre of the Proposed Development. Given the difficulty of surveying for this species, and the number of occasions on which it was seen, a possible territory was assigned in this area. There were no observations of this species during vantage point surveys and no records during 2022 or 2023, which would accord with the SRSG data, showing little breeding activity in the region at least during 2022.

8.5.71 Given the small population present in this region, although the breeding was ephemeral, it would be considered to be of regional importance, due to the presence of one likely breeding territory in a number of NHZs with small populations of this species.

White-tailed Eagle

8.5.72 White-tailed eagle are an Annex 1 / Schedule 1 / SBL species, are amber-listed on BoCC 5, and are considered to be at risk from wind farms (SNH, 2018a)[59]. The level of legal protection for white-tailed eagle is due to historic and current levels of persecution.

8.5.73 The population estimate for NHZ 10 is estimated at zero territorial pairs, and one and zero territorial pairs respectively for NHZ 7 and 21 (Wilson, 2015)[60]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[61] has one occupied territory out of one checked in the Inverness-shire area in 2022 and two in Badenoch & Strathspey.

8.5.74 While this species was not recorded as breeding within the Site, an active nest was recorded in the buffer area in 2023 (See **Technical Appendix 8.2** for more information). Flight activity was recorded during the VP surveys together with observations recorded during the breeding raptor surveys in the study area.

8.5.75 **Table 8.15** shows the flight activity recorded during the VP surveys. The table shows that there has been a consistency of use of the Site by this species throughout the different survey seasons.

Table 8.15: Results of VP Surveys for White-tailed Eagle

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
White-tailed eagle (Haliaeetus albicilla)	September 2020 - February 2021	1	1	1	63	63
	March 2021 - August 2021	1	1	2	508	508
	September 2021 - February 2022	1	1	8	1,147	1,055
	March 2022 - August 2022	1	1	4	611	427
	January 2023 - February 2023	1	1	1	983	983
	March 2023 - August 2023	1	1	1	277	187
	September 2023 - December 2023	1	1	2	8	4

8.5.76 While there was no evidence of white-tailed eagle breeding on the Site, there was an active nest recorded within the buffer zone.

8.5.77 White-tailed eagle are considered to have an intrinsic value of national, given the small population and conservation status of the species. There was use of the Site by the species observed, but it was limited to ranging / foraging flights, but may be used by territory holding birds. The Site is considered to be of regional importance for the species as a result of the level of recorded use.

Other species

8.5.78 **Table 8.16** provides the VP data for those species recorded during the VP surveys divided between the survey seasons, and a summary evaluation is provided in **Table 8.17** for all other Annex 1 / Schedule 1 / non-passerine SBL / red-listed species (according to BoCC 5), plus any species considered to be at risk from wind farms (SNH, 2018a)[62]. Snipe *Gallinago gallinago* has also been included in **Table 8.17** as this species has been shown to be negatively affected by wind farms (Pearce-Higgins, 2012)[63].

[59] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[60] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[61] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.
[62] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[63] Pearce-Higgins, J. W., Stephen, L., Douse, A. and Langston, R. H. W. (2012). Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology.

Table 8.16: Results of VP Surveys – Other Species

Species	Survey Season	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Goshawk (Accipiter gentilis)	March 2023 – August 2023	1	1	1	140	140
Greenshank (Tringa nebularia)	September 2023 – December 2023	2	2	1	98	0

Table 8.17: Conservation Evaluations – Other Species

Species	Reason for inclusion	Occurrence on proposed development	Evaluation	Justification
Black grouse	SBL / Red listed / At risk from wind farms	Incidental sightings by estate staff but no evidence of an active lek. One territory assigned due to the presence of 2 males and one female on one occasion, but no other evidence of use observed	Local	Limited occurrence on Site. There are some historic leks present in the wider area but no lekking was observed during surveys. As such, Local assigned due to sensitivity of species but limited occurrence on Site would not result in significant impacts.
Capercaillie	Annex 1 / Schedule 1 / SBL / Red listed / At risk from wind farms / proximity of Kinveachy Forest SPA of which capercaillie is a qualifying species	No evidence of the species on the Site.	Less than local	Not considered to be present on the Site.
Crested tit	Schedule 1 / proximity of Kinveachy Forest SSSI of which crested tit is a qualifying species	No evidence of the species on the Site.	Less than local	Not considered to be present on the Site.
Dunlin *Calidris alpina*	Annex 1 (subspecies *schinzii* only) / SBL / Red listed / At risk from wind farms	Two possible breeding territories (in the west of the Site, one within the Site boundary and one in the survey buffer) in 2021.	Local	Some use of the Site, but due to the location of the territories – on the western edge no impacts likely to occur.
Goshawk	Schedule 1 / At risk from wind farms	One flight recorded during VPs	Less than local	Very limited use of the Site.
Greenshank	Annex 1 / Schedule 1 / At risk from wind farms	One flight recorded during VPs	Less than local	Very limited use of the Site.
Herring gull Larus argentatus	SBL / Red listed / At risk from wind farms	Some flight activity recorded over the Site	Less than local	Very limited use of the Site.
Scottish crossbill	Annex 1 / Schedule 1 / SBL / proximity of Kinveachy Forest SPA and SSSI of which Scottish crossbill is a qualifying species	No evidence of the species on the Site.	Less than local	Not considered to be present on the Site.
Snipe	Negatively affected by wind farms	Two probable and four possible breeding territories recorded in 2021 (1 possible within 1,000m of turbine locations) and four possible breeding territories recorded in 2022 of which two were within 1,000m of turbines.	Less than local	Regional population is estimated at 690 breeding pairs in NHZ 10; 1,309 and 133 breeding pairs respectively are estimated in NHZs 7 and 21 (Wilson, 2015)[64]. Numbers of birds using the Site are not considered locally significant.
Whimbrel Numenius phaeopus	Schedule 1 / Red listed / Negatively affected by wind farms	Three records from 2022 presumed to be from birds passing through.	Less than local	Very limited use of the Site - considered to be a vagrant on the Site.

[64] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.

8.6 Future Baseline

8.6.1 If the current land management practices were to continue, the range and condition of habitats currently present is likely to be maintained, which means there are no immediate changes to the ornithological species and populations present on the Site.

8.6.2 There may be changes to the ornithological components of the Site as a result of wider population changes; some species in the UK are in decline due to pressures elsewhere and some species' ranges are moving northwards as a result of changes in spring temperatures associated with climate change. These changes would generally occur immaterial of whether the Proposed Development went ahead or not.

Ornithological Features Brought Forward for Assessment

8.6.3 The following applies to all ornithological receptors brought forward to the detailed ornithological impact assessment stage:

- their value is assessed as being important at a local or higher level (and / or they are subject to some form of legal protection); and
- they are potentially vulnerable to significant impacts from the Proposed Development.

8.6.4 The receptors which meet those criteria are considered Important Ornithological Features (IOFs) and the ornithological impact assessment concerns such features only. **Table 8.18** reviews the ornithological receptors described above and assesses which receptors will be brought forward for further assessment.

8.6.5 It includes all species which have been assessed as local or greater conservation value.

8.6.6 Although pink-footed goose activity was limited, such that its value was assessed at less than local, due to the presence of flocks of birds a relatively large number of flight seconds at risk were amassed. Collision risk impacts are therefore considered for this species.

Table 8.18: Review of Ornithological Receptors

Receptor	Nature Conservation Evaluation	Brought forward for further assessment
Kinveachy Forest SPA	International	No – there was no evidence of the qualifying species (capercaillie) use of the Site and there would be no impacts on the species' habitat.
Loch Vaa SPA	International	No – there was no evidence of the qualifying species (Slavonian grebe) use of the Site.
Kinveachy Forest SSSI	National	Yes – due to the overlap of the Site boundary with the SSSI boundary, direct effects on the SSSI and its qualifying species are possible.
Loch Vaa SSSI	National	No – there was no evidence of the qualifying species (Slavonian grebe and goldeneye) use of the Site.
Kinveachy Forest IBA	Regional	No – there was no evidence of the qualifying species (capercaillie) use of the Site.
Curlew	Local	Yes – due to a number of probable and possible territories having been identified on the Site, and associated recorded flight activity, disturbance / displacement and collision risk impacts are assessed.
Golden Eagle	Regional	Yes – due to a large number of at risk bird seconds of an Annex 1 and Schedule 1 listed species, collision risk impacts are assessed.
Golden Plover	Local	Yes – due to a confirmed territory and a number of probable and possible territories having been identified on the Site, and associated recorded flight activity, disturbance / displacement and collision risk impacts are assessed.
Greylag Goose	Local	Yes – due to confirmed territories on the Site, and a relatively large number of at risk bird seconds, disturbance / displacement and collision risk impacts are assessed.
Merlin	Local	Yes – due to the presence of possible territories of an Annex 1 and Schedule 1 listed species, disturbance / displacement impacts are assessed.
Pink-footed Goose	Less than local	Yes – due to a relatively large number of at risk bird seconds, collision risk impacts are assessed.
Red Kite	County	Yes – due to a large number of at risk flight seconds of an Annex 1 and Schedule 1 listed species, collision risk impacts are assessed.
Short-eared owl	Regional	Yes – presence of a territory of the species in 2021 in the central part of the Proposed Development.
White-tailed Eagle	Regional	Yes – due to the presence of an active nest (albeit in the buffer zone), and a large number of at risk flight seconds of an Annex 1 and Schedule 1 listed species, collision risk impacts are assessed.

8.7 Mitigation Measures

8.7.1 In line with CIEEM guidelines[65], the impact assessment in this chapter is carried out on the basis that mitigation measures will be in place during construction and operation. The following good practice and mitigation measures will be applied to the Proposed Development during construction and operation to ensure that effects

[65] Chartered Institute of Ecology and Environmental Management (CIEEM). (2022). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester.

on IOFs are reduced. The Applicant would be content that these measures be conditioned.

Construction Phase

8.7.2 Details of construction mitigation measures will be provided in a Construction Environmental Management Plan (CEMP). The CEMP will be submitted to The Highland Council for approval, in consultation with NatureScot and SEPA, post-consent but prior to development commencing. The CEMP will include information on the following ecological related activities:

- construction works will require a Construction Method Statement (CMS) to be prepared post-determination and in advance of the commencement of construction on site; and
- construction works will be overseen by an Ecological Clerk of Works (ECoW) and their role and responsibilities will be detailed in a CEMP.

8.7.3 Wherever possible, vegetation clearance will take place outside the bird breeding season (i.e. September – mid-March). Should this not be possible, then the vegetation to be removed will be searched by a suitably qualified ecologist no more than 24 hours before clearance commences.

8.7.4 Nests of non-Schedule 1 or non-Annex 1 species present will be marked with a buffer (likely to be 5m, but can be less with ECoW oversight) to prevent damage to the nest. This buffer can only be removed with ECoW approval once the nest is no longer in use.

8.7.5 In the 12 months before construction commences, breeding raptor surveys should be undertaken (and should also be carried out during construction if construction falls within a breeding season) with the aim of identifying the presence of any Annex 1 or Schedule 1 species which may be disturbed by the construction work.

8.7.6 A toolbox talk will also be provided during the induction process, detailing that there may be sensitive species on the Site during the construction period.

8.7.7 Care will be taken to avoid disturbing these birds if present and sightings should be reported to the ECoW for further investigation. These actions should be particularly targeted at golden eagle, white-tailed eagle and red kite.

8.7.8 Should the nest (or where applicable the roost) of an Annex 1 or Schedule 1 species be present, then disturbance buffers based on Goodship & Furness (2022)[66] will be established around the nest and no construction activity should be allowed within this area. The ECoW will carry out a risk assessment if access roads are within the buffer distance of the nest to establish if they can be used safely.

Operational Phase

8.7.9 A Habitat Management and Biodiversity Enhancement Management Plan (HMBEP) will be established. This will aim to monitor the occurrence of sensitive species on the Site with a view to identifying habitat management measures to support species which appear to be declining.

8.7.10 This has been provided in outline (**Technical Appendix 7.5**) and will be submitted to The Highland Council for approval, in consultation with NatureScot, before construction commences. It aims to particularly improve the quality of peatland habitats on the Site, and the extent of native habitats through the promotion of rewilding in the wider area.

8.7.11 As a condition of consent of the Dunmaglass Wind Farm, also in the Monadhliath Mountains, there was a requirement stipulated by THC for the developer to establish a Nature Conservation Management Plan (NCMP). As part of the NCMP a Regional Eagle Conservation Management Plan (RECMP) will include the provision of a fund and management assistance within NHZ 10 to enhance the conservation of breeding golden eagles. The RECMP was approved by THC on 21st July 2014. The Applicant is willing to contribute to the plan via financial assistance and the provision of monitoring data to the RECMP project officer.

Decommissioning Phase

8.7.12 Construction works will be overseen by an ECoW and their role and responsibilities will be detailed in a Decommissioning Environmental Management Plan. Should decommissioning activities fall between the period of April to August inclusive then monitoring will be conducted to include surveys for breeding raptors and / or other Schedule 1 species.

8.7.13 Wherever possible, vegetation clearance will take place outside the bird breeding season (i.e. works to be carried out between September – mid-March). Should this not be possible, then the vegetation to be removed will be searched by a suitably qualified ecologist no more than 24 hours before clearance commences.

[66] Goodship, N. & Furness, R. (2022). Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283, s.l.: s.n.

8.7.14 Should nests of Annex 1 and / or Schedule 1 species be identified during decommissioning then these will be buffered using buffer distances appropriate for the species in question, following guidance (e.g. Goodship & Furness, 2022[67]). Any activity within this distance would only be permitted if authorised by the ECoW, who would determine the schedule of monitoring during the breeding season.

8.7.15 Nests of non-Annex 1 and / or non-Schedule 1 species that are present will be marked with a buffer (likely to be 5m, but can be less with ECoW oversight or more if the situation warrants) to prevent damage to the nest. This buffer will only be removed with ECoW approval once the nest is no longer in use.

8.7.16 A tool-box talk will also be provided during the decommissioning site induction process, detailing that there may be sensitive species on the Site during the decommissioning period and that care should be taken to avoid disturbing these birds if present and that sightings should be reported to the ECoW for further investigation. These actions will be particularly targeted at species with Annex 1 or Schedule 1 status but the protections on all birds and their nests and young will also be explained.

8.8 Identification and Evaluation of Key Impacts

Assessment of Construction Phase Impacts

8.8.1 The following impacts may arise during the construction stage:

- direct and / or indirect habitat loss: This is likely to be a continuous process, with impacts carrying over into the operational phase as well. As such, it is assessed in entirety here; and
- disturbance and displacement as a result of human activity. Included in this is consideration of barrier effects.

8.8.2 These potential impacts are addressed for each designated site or species brought forward to assessment in turn.

Designated Sites

Kinveachy Forest SSSI

8.8.3 Habitat changes at the Site will have **no significant effect** upon Kinveachy Forest SSSI as the effect is predicted to be local, and especially given the absence of breeding on the Site by any of the qualifying species. There would be no works within the SSSI itself.

8.8.4 Species listed on the SSSI citation (capercaillie, Scottish crossbill, and crested tit) were not recorded on the Site during any of the ornithological surveys. As such, effects on the SSSI population of any of these species is not considered further.

8.8.5 While Turbines 1 and 2 are located immediately just outside of the SSSI boundary, they are sited as such to have no oversail of the SSSI. If micro-siting of these turbines is required, this should be to the west only to ensure no oversail of the SSSI.

Species

Curlew

8.8.6 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on curlew. Confidence in this assessment is considered near certain.

8.8.7 Curlews are known to be sensitive to construction disturbance (Pearce-Higgins, 2012)[68] with reductions of up to 40% occurring within 620m of wind farm developments (although other studies have not found this effect (Whitfield, 2010)[69]).

8.8.8 There were 22 possible breeding territories identified in 2021, and 17 probable and 28 possible breeding territories identified in 2022 (**Figures 8.3 - 8.5** refer).

8.8.9 If the precautionary figure of 40% reduction of breeding territories is applied (Pearce-Higgins, 2012)[70] to territories within 620m of the wind turbine positions and construction of associated infrastructure, then one possible territory (2021) and one probable and six possible territories (2022) might be affected. This would amount to displacement of 0.2 possible territories in 2021, and 2.8 territories in total in 2022. This would suggest that between zero and three pairs could be displaced per year.

8.8.10 It is therefore considered possible that there may be a reduction in breeding activity in the vicinity of the Proposed Development. There is a displacement effect which commences during the construction period.

8.8.11 Construction of the Proposed Development may result in the loss of up to three breeding pairs as a result of disturbance. This would likely persist following construction, although there is uncertainty on this point.

[67] Goodship, N. & Furness, R. (2022). Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283, s.l.: s.n.
[68] Pearce-Higgins, J. W., Stephen, L., Douse, A. and Langston, R. H. W. (2012). Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology.
[69] Whitfield, D. G. (2010). Are breeding Eurasian curlew *Numenius arquata* displaced by wind energy developments) Banchory: NRP.
[70] Pearce-Higgins, J. W., Stephen, L., Douse, A. and Langston, R. H. W. (2012). Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology.

8.8.12 However, this loss is likely to be significant at the local level only due to the robust populations present at regional and county level, despite the falling populations for this species. Any effects are therefore considered to be **not significant** in EIA terms. Confidence in this assessment is considered near certain.

Golden Eagle

8.8.13 The extent of direct and indirect habitat loss associated with the construction work will have **no significant construction effects** on golden eagle. Confidence in this assessment is considered near certain.

8.8.14 Any disturbance impacts on golden eagle during construction of the Proposed Development will be limited as there are no golden eagle territories within the area where disturbance effects could occur. There will be **no construction disturbance** to nesting locations. Confidence in this assessment is considered near certain.

8.8.15 There could be limited displacement effects during construction, with golden eagles avoiding foraging over the Proposed Development during the construction period. Displacement effects are likely to be short term and limited to the vicinity of the construction area and as such, will be limited in temporal and geospatial extent.

8.8.16 Displacement effects are considered to be **not significant**, given the area over which these individuals are likely to be ranging. Confidence in this assessment is considered probable.

Golden Plover

8.8.17 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on golden plover. Confidence in this assessment is considered near certain.

8.8.18 There is evidence of golden plover both being sensitive to wind farm development (Sansom *et al.*, 2016)[71] and on a longer-term survey, being resilient to wind farm development (Fielding and Haworth, 2013)[72].

8.8.19 Three probable and seven possible breeding territories were identified in 2021; one confirmed, 14 probable and 14 possible breeding territories were identified in 2022; and one probable and four possible breeding territories were identified in 2023 (**Figures 8.3 – 8.5** refer).

8.8.20 If the findings of Sansom *et al.* (2012)[73] are precautionarily applied (evidence of displacement at up to 400m from turbine placements), then one probable and five possible breeding territories (2021), one confirmed, nine probable, and ten possible breeding territories (2022), and one probable and four possible breeding territories (2023) might be affected. This would suggest that between one and ten breeding pairs could be displaced per year.

8.8.21 It is, therefore, considered possible that there may be a reduction in breeding activity in the vicinity of the Proposed Development.

8.8.22 Construction of the Proposed Development could result in the loss of up to ten breeding pairs as a result of disturbance. Whilst the impact may be irreversible, the impact on a golden plover population of local importance will be small. Any effects are therefore considered to be **not significant**. Confidence in this assessment is considered near certain.

Greylag Goose

8.8.23 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on greylag goose. Confidence in this assessment is considered near certain.

8.8.24 There was limited evidence of breeding greylag goose recorded during the baseline surveys, with one confirmed breeding territory in the far east of the Site in 2021, and two confirmed breeding territories located on the slopes of Cnocan Dubh in 2022. In addition, one probable and one possible breeding territory were identified in 2022 (**Figures 8.3 – 8.5** refer). Transitory flight activity was also recorded.

8.8.25 As such, there could be limited displacement effects during construction.

8.8.26 Barrier effects may cause greylag goose to avoid transiting over the Site during the construction period. However, greylag goose are generally tolerant of human activity as evidenced by their presence in towns and cities (Forrester, 2007)[74] Additionally, these birds form part of the British naturalised population which is of lower conservation status than the migratory populations.

8.8.27 It is considered likely there will be limited effects on this species and no change in their occurrence is expected. Any effects will be **not significant**. Confidence in this assessment is considered near certain.

[71] Sansom, A., Pearce-Higgins, J. W. and Douglas, D. T. (2016). Negative impact of wind energy development on a breeding shorebird assessed with a BACI study design. Ibis.
[72] Fielding, A. H. and Haworth, P. F. (2013). Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines 2005 – 2013, s.l.: s.n.
[73] Sansom, A., Pearce-Higgins, J. W. and Douglas, D. T. (2016). Negative impact of wind energy development on a breeding shorebird assessed with a BACI study design. Ibis.
[74] Forrester, R. W., Andrews, I. J., McInemy, C. J., Murray, R. D., McGowan, R. Y., Zonfrillo, B., Betts, M. W., Jardine, D. C. and Grundy, D. S. (eds). (2007). The Birds of Scotland. Scottish Ornithologists Club, Aberlady.

Merlin

8.8.28 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on merlin. Confidence in this assessment is considered near certain.

8.8.29 There will be no significant disturbance effects on merlin during construction. While no territories were recorded either on the Site or within the buffer, and recorded flight activity was limited, breeding raptor surveys in 2022 recorded activity, within the survey area, but at some distance from the turbine array which suggested a territory could be present. More information is provided in the Confidential Annex.

8.8.30 As a result, this means that without effective mitigation, construction of the access track in this area, which involves connecting two stretches of existing track, and upgrading works of existing tracks in this area, would be contrary to existing legislation.

8.8.31 In order to ensure that any breeding Merlin are protected from unlawful disturbance, the following mitigation is regarded as essential:

- construction of the stretch of access track across this area, and upgrading works to existing tracks in this area, should be carried out entirely outwith the breeding season for this species (i.e. within the period September – mid March). This will ensure that come the following year's breeding season (considered to be March – August), the cause of potential disturbance to the nest site will have occurred; and
- monitoring by an experienced ECoW during the breeding season to determine when and how further construction works may progress.

8.8.32 There could be limited displacement effects during the construction phase, with merlin avoiding foraging over the Site. Given the widespread availability of similar habitat in the wider area and the distance between the territory and what will be the main works area, displacement effects are considered **not significant**, given the area over which these individuals are likely to be ranging. Confidence in this assessment is considered probable.

Pink-footed Goose

8.8.33 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on pink-footed goose. Confidence in this assessment is considered near certain.

8.8.34 There could be limited displacement effects upon wintering geese during construction, but pink-footed goose were not recorded feeding in the vicinity of the Site which would limit the likelihood of this effect occurring.

8.8.35 There is potential for pink-footed goose to avoid transiting over the Proposed Development during the construction period due to barrier effects associated with the construction. However, the evidence for this is limited, and given most flights occurred during migration periods and as such individual birds would have only very limited exposure and any effects would be very limited.

8.8.36 It is considered likely there will be limited effects on this species and no change in their occurrence is expected. Any effects will be **not significant**. Confidence in this assessment is considered near certain.

Red Kite

8.8.37 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on red kite. Confidence in this assessment is considered near certain.

8.8.38 There will be no significant disturbance effects on red kite during construction. While breeding raptor surveys in 2021 and 2022 did record activity in the Site suggesting a currently active territory, there will be no disturbance effect given the separation distance between location of construction activities and the territory location. There is limited suitable habitat within the area where disturbance could occur on breeding kites so it is unlikely that a new territory would establish, but pre-construction surveys would also identify any breeding as red kite are protected from illegal disturbance at and in the vicinity of their nest. There could be limited displacement effects during the construction phase, with red kite avoiding foraging over the Site. However these would be temporary and reversible.

8.8.39 Given the widespread availability of similar habitat in the wider area, displacement effects are considered **not significant**, given the area over which these individuals are likely to be ranging. Confidence in this assessment is considered probable.

Short-eared owl

8.8.40 The extent of direct and indirect habitat loss associated with the construction work will have **no significant construction effects** on short-eared owl. Confidence in this assessment is considered near certain.

8.8.41 A territory was present during 2021, but not during 2022 or 2023. As noted in section 8.5.69, this species is an ephemeral or intermittent breeder, only breeding when there is sufficient prey. They are not site faithful, but they can return to the same general area.

8.8.42 The disturbance distance for the species is estimated at 300 – 500 m (Goodship & Furness 2022)[75]. While the territory in 2021 was not precisely located, it lay to the north of the site and as such, potential for any disturbance to occur would be reduced both by the intermittent breeding and the likely location of the territory beyond the disturbance limits of the species. Should the species be identified during construction surveys, then the mitigation described in section 8.7 would apply. As such, there would be **no significant disturbance or displacement effects** on a nest location.

8.8.43 Short-eared owl also has a limited foraging range beyond their territory, with a core range of 2 km. They are day flying as well as night flying; as such there may be some displacement away from foraging areas which overlap with the construction areas. At the same time, they can be relatively tolerant of human activity while foraging. As such, any effects on foraging displacement are likely to be short term and geographically limited, and owls would still have the ability to forage when construction is not being carried out. This would mean there would **be no significant construction effects** on foraging.

White-tailed Eagle

8.8.44 The extent of direct and indirect habitat loss associated with the construction work will have **no significant construction effects** on white-tailed eagle. Confidence in this assessment is considered near certain.

8.8.45 While there is an active nest in the vicinity of the Site, disturbance impacts during construction of the Proposed Development will be limited as construction activities will be localised and at a level similar to current activities on the estate. There will be **no construction disturbance** to nesting locations as the distance between site infrastructure and the nest location is greater than the disturbance distance of this species[76]. Confidence in this assessment is considered near certain.

8.8.46 There could be limited displacement effects during construction, with white-tailed eagles avoiding foraging over the Proposed Development during the construction period. Displacement effects are likely to be short term and limited to the vicinity of the construction area and as such, will be limited in temporal and geospatial extent.

8.8.47 Displacement effects are considered to be **not significant**, given the area over which these individuals are likely to be ranging. Confidence in this assessment is considered probable.

Assessment of Operational Phase Impacts

8.8.48 The following impacts are considered for the operational phase:

- disturbance / displacement (including barrier effects); and
- additional mortality as a result of collision risk.

8.8.49 Not all species were observed to have enough flight activity at collision risk height to warrant collision risk modelling being carried out. The following species are assessed for collision risk:

- curlew;
- golden eagle;
- golden plover;
- greylag goose;
- pink-footed goose;
- red kite; and
- white-tailed eagle.

8.8.50 For all other species, levels of observed flight activity indicated that the effects of additional collision risk will be so small as to be undetectable and therefore **not significant**.

8.8.51 To account for the variability in the duration of surveys (i.e. September 2020 to August 2022, and then January to December 2023), two CRM models were utilised. The first used flight data recorded from VPs 8 – 10, and the second used flight data recorded from VPs 12 and 13. The results of the two models were then summed to produce an overall collision risk estimate for each species for the Site.

8.8.52 The biometric parameters used within the collision risk model (CRM) for those species listed above are provided in **Table 8.19** and **Table 8.20**. A random CRM exercise was undertaken for all species.

[75] Goodship, N. & Furness, R. (2022). Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283, s.l.: s.n

[76] Goodship, N. & Furness, R. (2022). Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283, s.l.: s.n

Table 8.19: CRM Biometric Parameters (September 2020 – August 2022)

Species	Bird length (m)	Wingspan (m)	Bird speed (m/s)	Avoidance rate	Months active	Daylight hours	Nocturnal hours	Total hours	Assumed activity period	Flapping / gliding
Curlew	0.55	0.9	16.3	0.980	Mar - Aug	2852.13	0.00	2852.13	Daylight hours only	F
Golden eagle	0.82	2.12	11.9	0.990	All year	4510.95	0.00	4510.95	Daylight hours only	F
Golden plover	0.28	0.72	13.7	0.980	Feb - Aug	3125.87	781.47	3907.34	Daylight hours plus 25% nocturnal hours	F
Greylag goose	0.82	1.64	17.1	0.998	Sept – May	2970.81	0.00	2970.81	Daylight hours only	F
Pink-footed goose	0.68	1.52	17.1	0.998	Sept-Mar	2026.49	0.00	2026.49	Daylight hours only	F
Red kite	0.63	1.85	12	0.99	All year	4510.95	0.00	4510.95	Daylight hours only	G
White-tailed eagle	0.8	2.2	13.6	0.95	All year	4510.95	0.00	4510.95	Daylight hours only	F

Table 8.20: CRM Biometric Parameters (January – December 2023)

Species	Bird length (m)	Wingspan (m)	Bird speed (m/s)	Avoidance rate	Months active	Daylight hours	Nocturnal hours	Total hours	Assumed activity period	Flapping / gliding
Curlew	0.55	0.9	16.3	0.980	Mar - Aug	2848.65	0.00	2848.65	Daylight hours only	F
Golden eagle	0.82	2.12	11.9	0.990	All year	4504.20	0.00	4504.20	Daylight hours only	F
Golden plover	0.28	0.72	13.7	0.980	Feb - Aug	3111.84	777.96	3889.80	Daylight hours plus 25% nocturnal hours	F
Greylag goose	0.82	1.64	17.1	0.998	Sept – May	2960.62	0.00	2960.62	Daylight hours only	F
Pink-footed goose	0.68	1.52	17.1	0.998	Sept-Mar	2020.68	0.00	2020.68	Daylight hours only	F
Red kite	0.63	1.85	12	0.99	All year	4504.20	0.00	4504.20	Daylight hours only	G
White-tailed eagle	0.8	2.2	13.6	0.95	All year	4504.20	0.00	4504.20	Daylight hours only	F

Designated Sites

Kinveachy Forest SSSI

8.8.53 Species listed on the SSSI citation (capercaillie, Scottish crossbill, and crested tit) were not recorded on the Site during any of the ornithological surveys. As such, effects on the SSSI population of any of these species is not considered further.

Species

Curlew

8.8.54 This species has been observed transiting the Site below and at collision risk height, together with individuals on the ground.

8.8.55 No confirmed territories were identified within the Site, with 22 possible territories identified in 2021 (the majority within the Site boundary), 17 probable and 28 possible identified in 2022, and no territories identified in 2023 (**Figures 8.3 – 8.5** refer).

8.8.56 The displacement effect of the Proposed Development has already been described within the construction assessment (earlier in **Section 8.8**). This estimated that there could be between zero – three territories lost to displacement/disturbance during the construction period and there is some evidence to suggest these do not return following construction.

8.8.57 The number of territories lost is small in comparison to the regional and county population so although the effect is likely to persist through the lifetime of the Proposed Development, there will be **no significant operational effects**. Confidence in this assessment is considered certain.

8.8.58 **Table 8.21** shows the estimated collision risk for curlew. The collision risk model has predicted the loss of five birds over the 40-year lifetime of the Proposed Development. It should be remembered that if displacement occurs, then collision risk would be reduced; this level of collision risk is predicted on no displacement occurring.

8.8.59 Therefore, there will be **no significant operational effects** on curlew as a result of collisions with the Proposed Development when compared to the wider population of NHZ 10 (811 breeding pairs, and 249 and 385 breeding pairs respectively for NHZ 7 and 21 (Wilson, 2015)[77], either when considered separately or cumulatively.

Table 8.21: Collision risk estimate for Curlew

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 40 years
Curlew	0.135	7.4	5.4

Golden Eagle

8.8.60 This species has been observed transiting the Site below, at and above collision risk height. No breeding attempts were recorded during the field surveys.

8.8.61 A long term study at Benn an Tuirc Wind Farm (Walker, McGrady, McCluskie, Madders, & Mcleod, 2016)[78] and Fielding and Haworth (2011)[79] at Edinbane Wind Farm showed that golden eagle will avoid the turbine array but there were no other detectable effects of the presence of a wind farm development in an eagle's range. Birds continued to hunt in proximity to the wind farm.

8.8.62 Golden Eagle Territory (GET) modelling has been carried out (**Technical Appendix 8.4**) which shows that the area which contains the turbines contains a mix of highly suitable / low suitable territory for Golden eagle. The central area of the turbine area is generally low suitability, but the south-east turbines are in an area of moderate to high suitability. This area is approximately 2.35km^2. There may be additional displacement around two other western turbines which sit on the edge of highly suitable habitat.

8.8.63 This would not be considered a significant impact given the large range of this species and the scale of the Proposed Development in an open environment with few other constraints. However, the impacts will be long term in duration. Confidence in this assessment is considered probable.

8.8.64 **Table 8.22** shows the estimated collision risk for golden eagle. The collision risk model has predicted the loss of 11 birds over the 40-year lifetime of the Proposed Development.

Table 8.22: Collision risk estimate for Golden Eagle

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 40 years
Golden eagle	0.277	3.6	11.08

8.8.65 Population Viability Modelling (PVA) (**Technical Appendix 8.4**) was carried out using both a deterministic and a stochastic model. These models showed contradictory outcomes with the deterministic model showing increasing populations even after the additional mortality as a result of collision risk was included, while the stochastic model showed declines in all populations, even the baseline model. Both

[77] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[78] Walker, D., McGrady, M., McCluskie, A., Madders, M. and Mcleod, D. R. A. (2016). Resident Golden Eagle ranging behaviour before and after construction of a windfarm in Argyll. Scottish Birds 24-40.
[79] Fielding, A.H. and Haworth, P.F. (2011). Edinbane Windfarm: Monitoring Report 2007-2010. Report for Highland Regional Council.

models represent a different approach to modelling; the deterministic model is usually too optimistic, in that it assumes there is no variation in the population, except as expressed in the means. The stochastic model allows for variation, but for smaller populations is more likely to decline to extinction because of that.

8.8.66 The current understanding of the Golden eagle population dynamics across the region, show a recent improvement in the population within the central and southern Highlands. The 2015 population survey showed a large increase (Hayhow D.B., Benn, Stevenson, Stirling-Aird, & Eaton, 2017)[80] (possibly linked to increased scrutiny of illegal persecution in this area which may cause a reduction in its occurrence). This may mean the stochastic model is too conservative or has not captured current population parameters correctly. Given that, and the fact that stochastic models can be too conservative with small populations, particularly when the population has strong population growth parameters (as demonstrated by the deterministic model), then it is likely that the stochastic model is overestimating the impact of the collision risk on the population.

8.8.67 At the same time, the collision risk estimates do not take account of displacement effects which are known to occur in this species. As such, the collision risk is likely to be substantially lower than the estimate, as birds will avoid the central turbine array and as such, the exposure to collision risk will be lower than in the collision modelling which does not account for that level of avoidance behaviour in the avoidance rate used.

8.8.68 Therefore it is considered that the collision risk is **unlikely to be significant** to this species, although there is some uncertainty around this. Confidence in this assessment is probable.

Golden Plover

8.8.69 One confirmed territory was located on the slopes of Carn Coire na Cluanaich during breeding bird surveys in 2022. In addition, three probable and seven possible territories were identified in 2021, 14 probable, and 14 possible territories were identified in 2022, and one probable and four possible territories were identified in 2023 (**Figures 8.3 - 8.5** refer).

8.8.70 The evidence of displacement by golden plover is varied and mostly relates to displacement of breeding territories. This has been found to occur in some locales (Sansom *et al.*, 2016)[81], but other sites have persistently maintained their golden plover populations over much longer periods (Fielding and Haworth, 2013)[82] or no effects were identified (Douglas, Bellamy and Pearce-Higgins, 2011)[83].

8.8.71 It is, therefore, considered possible that there will be a reduction in breeding activity within the Site with possible disturbance / displacement of potentially between one and ten breeding pairs. In terms of the NHZ population (2,702 breeding pairs in NHZ 10, 3,009 breeding pairs in NHZ 7, and 94 breeding pairs in NHZ 21 (Wilson, 2015)[84]), there would be **no significant operational effects**.

8.8.72 There was limited use of the Site during the migration periods. Habitat will remain available and potentially enhanced as a result of habitat management, but there may be some localised displacement associated with a mobile species which is stopping off on suitable habitat.

8.8.73 There is suitable habitat in the surrounding area such that the displacement effect will be limited. As a result, there would be **no significant operational effects** because of the small number of birds affected from a much wider population. Confidence in this assessment is considered near certain.

8.8.74 **Table 8.23** shows the estimated collision risk for golden plover. The collision risk model has predicted the loss of 1 bird over the lifetime of the Proposed Development.

8.8.75 Therefore, there will be **no significant operational effects** on golden plover as a result of collisions with the Proposed Development when compared to the wider population of the NHZ (2,702 breeding pairs in NHZ 10, 3,009 breeding pairs in NHZ 7, and 94 breeding pairs in NHZ 21 (Wilson, 2015)[85]). Confidence in this assessment for this species is considered near certain.

Table 8.23: Collision risk estimate for Golden Plover

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 40 years
Golden plover	0.028	35.71	1.12

[80] Hayhow, D. B., Benn, S., Stevenson, A., Stirling-Aird, P. & Eaton, M. (2017). Status of Golden Eagle *Aquila chrysaetos* in Britain in 2015. Bird Study, 64, 281 – 294.
[81] Sansom, A., Pearce-Higgins, J. W. and Douglas, D. T. (2016). Negative impact of wind energy development on a breeding shorebird assessed with a BACI study design. Ibis.
[82] Fielding, A. H. and Haworth, P. F. (2013). Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines 2005 – 2013, s.l.: s.n.
[83] Douglas, D. J. T., Bellamy, P. T., & Pearce-Higgins, J.W. (2011). Changes in the abundance and distribution of upland breeding birds at an operational wind farm. Bird Study, 58, 37 – 43.
[84] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[85] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.

Greylag Goose

8.8.76 This species has been observed transiting the Site below, at and above collision risk height.

8.8.77 One confirmed territory was located in the far east of the Site during breeding bird surveys in 2021, and two were recorded located on the slopes of Cnocan Dubh overlooking Easter Strathnoon during breeding bird surveys in 2022. In addition, one probable and one possible territory were identified in 2022 (**Figures 8.3 – 8.5** refer).

8.8.78 Given that the majority of the recorded flight activity showed this species as transiting the Site, with a very low number of birds using the northern edge of the Site away from the turbine array, there is limited opportunity for displacement to occur to foraging geese.

8.8.79 Barrier effects of wind turbines have been identified which, for commuting geese, typically involved avoiding flying over a wind farm development by offsetting flight paths by a few hundred metres.

8.8.80 This was not a consistent effect and was only observed in some locations (Rees, 2012)[86]. Even if this displacement was to occur on movements around the Proposed Development, given the relative infrequency of movements across the Proposed Development, while there may be a slight energetic constraint, this is considered to be **not significant**.

8.8.81 As a result, there will be **no significant** effect on geese overflying the Proposed Development (be they migration flights or commuting flights between roosting and feeding sites) as a result of displacement or barrier effects on those populations of geese.

8.8.82 **Table 8.24** shows the estimated collision risk for greylag goose. The collision risk model has predicted the loss of 56 birds over the lifetime of the Proposed Development.

8.8.83 Therefore, there will be **no significant operational effects** on greylag goose as a result of collisions with the Proposed Development when - in the absence of a population estimate for the NHZ - compared to the wider Scottish population of 47,405 (Mitchell *et al*. (2011)[87]. Confidence in these assessments for this species is considered near certain.

Table 8.24: Collision risk estimate for Greylag Goose

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 40 years
Greylag goose	1.389	0.7	55.56

Merlin

8.8.84 No flight data for this species was recorded from those VP locations whose viewsheds incorporated the turbine array. Therefore collision risk modelling on this species was not undertaken.

8.8.85 However, a small number of flights were recorded around the approximate centre of the Site (**Figure 8.1.8a** and **Figure 8.1.9**, **Technical Appendix 8.1** refers) at below collision risk height.

8.8.86 The species was recorded during breeding raptor surveys in 2021 (outwith the Site to the north-east) and in 2022 (around the approximate centre of the Site with a level of recorded activity suggesting a currently occupied territory).

8.8.87 Displacement and barrier effects of the Proposed Development could affect this species.

8.8.88 As with construction effects, effects of displacement on merlin would be reduced because of the limited use they make of the Proposed Development area. As such, foraging would not be affected by displacement effects.

8.8.89 There is limited evidence as to how merlin respond to wind farms. However, in a number of SPAs they have been observed breeding close to overhead lines which suggests some tolerance of vertical infrastructure. Merlin in North America can nest in cities (Sale, 2015)[88], although those that do tend to be tree nesting.

8.8.90 Additionally, it is not unknown for merlin to reuse the same nest location but this tends to be unusual. It is observed more commonly in tree nesting pairs. Birds do remain in the same territory year on year but nest locations frequently move around within the territory (Sale, 2015)[89].

8.8.91 Therefore it is considered that there would be **no significant impact** of displacement on merlin. Confidence in this prediction is considered probable.

8.8.92 Even if the wind farm has a displacement effect, avoidance behaviour will cause birds to veer away from flying through / over the Proposed Development. Similarly,

[86] Rees, E. C. (2012). Impacts of wind farms on swans and geese: A review. Wildfowl, Volume 62, pp. 37-72.
[87] Mitchell, C., Griffin, L., Trinder, M., Neweth, J., & Urquhart, C. (2011). The status and distribution of summering Greylag Geese *Anser anser* in Scotland 2008–09. Bird Study 58.
[88] Sale, R. (2015). The Merlin. Snowfinch Publishing.
[89] Sale, R. (2015). The Merlin. Snowfinch Publishing.

barrier effects would result in merlin avoiding flying over the wind farm itself by offsetting flight paths by a few hundred metres.

8.8.93 Even if this displacement effect was to occur on movement around the Proposed Development, while there may be a slight energetic constraint this will not be considered to be significant.

8.8.94 As a result, and given the relatively small number of flights by this species, there will be **no significant impact** on merlin as a result of displacement or barrier effects. Confidence in this prediction is probable.

Pink-footed Goose

8.8.95 The baseline surveys indicated that pink-footed goose did not use the Site for foraging, however, flight activity was recorded over the Site at and above collision risk height. As such, displacement and barrier effects from the Proposed Development could affect this species.

8.8.96 Migration movements are highly unlikely to be affected by the presence of a wind farm development, given the birds are making relatively high altitude, long distance flights between staging areas. Even if the wind farm has a displacement effect, avoidance behaviour will cause birds to veer away from flying through / over the Proposed Development. Such behaviour has been noted (Rees, 2012)[90] but does not consistently occur. Given that individual birds will only fly over this area once or twice per year, it is considered that there will be **no significant operational effects**.

8.8.97 Similarly, the same review identified some barrier effects of wind turbines which for commuting geese typically involved avoiding flying over a wind farm development by offsetting flight paths by a few hundred metres. This was not a consistent effect and was only observed in some locations (Rees, 2012)[91]. Even if this displacement effect was to occur on movements around the Proposed Development, given the relative infrequency of movements across the Proposed Development, while there may be a slight energetic constraint, this is considered to be **not significant**.

8.8.98 As a result, there will be **no significant effect** on migratory geese overflying the Proposed Development as a result of displacement or barrier effects on those populations of geese.

8.8.99 **Table 8.25** shows the estimated collision risk for pink-footed goose. The loss of 75 birds over the life time of the Proposed Development, when compared to the NHZ population (for NHZ 10, the peak count of wintering pink-footed goose is estimated at seven (Wilson, 2015)[92]; for NHZs 7 and 21 respectively the peak count is four and 35,370 respectively), will **not give rise to a significant operational effect** on pink-footed goose. Because NHZs 10 and 7 do not hold any pink-footed goose populations, the individuals observed could not be from within those NHZs; they must be from either from NHZ 21 or, more likely migrant birds which were not local. Confidence in these assessments for this species is considered near certain.

Table 8.25: Collision risk estimate for Pink-footed Goose

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 40 years
Pink-footed goose	1.881	0.5	75.24

Red Kite

8.8.100 There was evidence for breeding within the Site but generally in areas where disturbance would not occur. The probable territory is approximately 500m from any infrastructure; however it is likely to be further than this as the area the territory is located on (see **Figure 8.2.3** and **Figure 8.2.5** in **Technical Appendix 8.2: Confidential Annex**) had no suitable features for kite nesting; the actual nest location is therefore likely to be further from infrastructure given where the nearest suitable habitat for nesting is.

8.8.101 There is some suggestion that red kites can be displaced from operational turbine arrays[93], although kites in that long term study did continue to forage within the array and it was unclear if the reduced activity was a function of displacement or a change in activity in the area. Kites were reported as the victims of collision risk.

8.8.102 On a precautionary basis, it would be assumed that there would be some level of operational displacement by local birds. However while activity was observed within what would become the turbine array area, levels of activity were greater to the north of this area, which would remain available for foraging kite. As a result, the removal of the area of ground supporting the turbine array is considered **not significant**. Areas with higher levels of activity within the Site are still available for foraging. Confidence in this assessment is considered to be probable.

8.8.103 **Table 8.26** shows the estimated collision risk for red kite. The collision risk model has predicted the loss of 27 birds over the 40 year lifetime of the Proposed Development. Given this is a substantial level of mortality a PVA was undertaken to

[90] Rees, E. C. (2012). Impacts of wind farms on swans and geese: A review. Wildfowl, Volume 62, pp. 37-72.
[91] Rees, E. C. (2012). Impacts of wind farms on swans and geese: A review. Wildfowl, Volume 62, pp. 37-72.
[92] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[93] Duffy, K & Urquhart B. (2014) Braes of Doune Windfarm Report on Red Kite studies 2004- 2012 NRP Ltd

model the effects of this on the local red kite populations. Details of this are provided in **Technical Appendix 8.4: Ornithology Modelling**.

8.8.104 This showed that the level of mortality would **not have a significant impact** on the population, which would continue to increase. Confidence in this assessment is considered near certain.

8.8.105 Previous research carried out in 2016 (Samson, Etheridge, Smart, & Roos, 2016)[94] had suggested that the Highland red kite population could be sensitive to additional mortality from collision risk due to the illegal persecution that the population was undergoing, which was restricting capacity to grow. However since 2016, the population has continued to grow and expand and as such, the robustness to additional mortality sources has increased.

Table 8.26: Collision risk estimate for Red Kite

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 40 years
Red kite	0.681	1.5	27.24

Short-eared owl

8.8.106 One possible territory was identified north of the turbine array. Short-eared owl are ephemeral breeders, breeding only when vole populations are at their max.

8.8.107 They tend to be low level flyers; no flight activity was recorded for this species, even in the year it was holding a territory and as such, collision risk would be **not significant** as flight activity was so low at collision risk height that collision risk could not be estimated.

8.8.108 The location of the territory suggests that displacement would also not be a factor due to it lying beyond the 300 – 500m distance for disturbance of this species (Goodship and Furness 2022)[95] and given that owls are not site faithful. As such, there would be **no significant effects** on this species during the construction phase.

White-tailed Eagle

8.8.109 This species has been observed transiting the Site below, at and above collision risk height. No evidence of breeding was recorded within the Site but an active nest was recorded in 2023 in the buffer zone.

8.8.110 With regards displacement effects, given the design and scale of the Proposed Development, it is considered that there will be **no significant operational effects** on white-tailed eagle, given the large range of this species and the scale of the Proposed Development in an open environment with few other constraints. However, the impacts will be long term in duration. Confidence in this assessment is considered probable.

8.8.111 **Table 8.27** shows the estimated collision risk for white-tailed eagle. The collision risk model has predicted the loss of 39 birds over the 40-year lifetime of the Proposed Development. This is a relatively high estimate for a species which has a small population.

8.8.112 As a result, PVA was carried out for this species as described in **Technical Appendix 8.4: Ornithology Modelling**. This showed that at the national level, the population growth is too strong to be impacted by the collision risk estimated for this species. This does not rule out local level effects, but given the strong population growth for the species, these would **not be considered significant**.

Table 8.27: Collision risk estimate for White-tailed Eagle

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 40 years
White-tailed eagle	0.97	1.0	38.8

Assessment of Decommissioning Phase Impacts

8.8.113 The existing baseline is difficult to define at the end of the operational life of a wind farm, as the level of use of a wind farm after many years of operation are difficult to determine, and the evidence base is scant as wind turbines are a relatively new technology. However, the effects of decommission are expected to be broadly similar to those associated with construction activities, albeit of reduced magnitude since activities will involve the removal of pre-existing infrastructure and the restoration of previously disturbed or destroyed habitats meaning that birds displaced and / or disturbed by construction and / or operation of the wind farm are likely to return following completion of activities.

8.8.114 In the event that the baseline is broadly similar to that described in **Section 8.5**, then the effects of decommissioning would be likely to be of a similar nature to

[94] Samson, A., Etheridge, B., Smart, J. and Roos, S. (2016). Population modelling of North Scotland red kites in relation to the cumulative impacts of wildlife crime and wind farm mortality. SNH, Battleby.

[95] Goodship, N. & Furness, R. (2022). Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283, s.l.: s.n

those seen during construction, but likely reduced in scope and scale and magnitude.

8.8.115 The following effects may arise during decommissioning:

- direct and / or indirect habitat loss during the decommissioning phase; and
- disturbance and displacement as a result of human activity on the Proposed Development.

8.8.116 These potential effects are addressed for each designated site and / or species brought forward to assessment in turn.

Designated Sites

Kinveachy Forest SSSI

8.8.117 All materials produced and waste streams will be contained within the Site throughout decommissioning works and subsequently removed from the Site, so there will be no direct or indirect habitat loss within the SSSI. Habitat changes at the Site will have **no significant adverse effect** upon the SSSI as the species listed on the SSSI citation (capercaillie, Scottish crossbill, and crested tit) have not been recorded on the Site and are not expected on the Site as the supporting habitat is not present on the Site. Confidence in this prediction is certain.

Species

Curlew

8.8.118 There is evidence of curlew breeding within or in close proximity to the Site. Any potential effects associated with decommissioning are likely to be short-lived, less extensive compared with the effects associated with construction, and habitats will subsequently be restored. In addition to this, displacement owing to construction and operation of the Proposed Development are already likely to be well established by this point in time. As a consequence, displacement, or habitat loss associated with decommissioning activity related to the Proposed Development will **not have a significant impact** on the curlew population using the area. Confidence in this prediction is near certain.

Golden Eagle

8.8.119 Any potential effects associated with decommissioning are likely to be short-lived, less extensive compared with the effects associated with construction, and habitats will subsequently be restored. In addition to this, displacement owing to construction and operation of the Proposed Development are already likely to be well established by this point in time. As a consequence, displacement, or habitat loss associated with decommissioning activity related to the Proposed Development will **not have a significant impact** on the golden eagle population using the area. Confidence in this prediction is near certain.

Golden Plover

8.8.120 There is evidence of golden plover breeding within or in close proximity to the Site. Any potential effects associated with decommissioning are likely to be short-lived, less extensive compared with the effects associated with construction, and habitats will subsequently be restored. In addition to this, displacement owing to construction and operation of the Proposed Development are already likely to be well established by this point in time. As a consequence, displacement, or habitat loss associated with decommissioning activity related to the Proposed Development will **not have a significant impact** on the golden plover population using the area. Confidence in this prediction is near certain.

Greylag Goose

8.8.121 There is evidence of greylag goose breeding within or in close proximity to the Site. Any potential effects associated with decommissioning are likely to be short-lived, less extensive compared with the effects associated with construction, and habitats will subsequently be restored. In addition to this, displacement owing to construction and operation of the Proposed Development are already likely to be well established by this point in time. As a consequence, displacement, or habitat loss associated with decommissioning activity related to the Proposed Development will **not have a significant impact** on the greylag goose population using the area. Confidence in this prediction is near certain.

Merlin

8.8.122 There is evidence of merlin occupying a territory within or in close proximity to the Site. Any potential effects associated with decommissioning are likely to be short-lived, less extensive compared with the effects associated with construction, and habitats will subsequently be restored. In addition to this, displacement owing to construction and operation of the Proposed Development are already likely to be well established by this point in time. As a consequence, displacement, or habitat loss associated with decommissioning activity related to the Proposed Development will **not have a significant impact** on the merlin population using the area. Confidence in this prediction is near certain.

Pink-footed Goose

8.8.123 Any potential effects associated with decommissioning are likely to be short-lived, less extensive compared with the effects associated with construction, and habitats will subsequently be restored. In addition to this, displacement owing to

construction and operation of the Proposed Development are already likely to be well established by this point in time. As a consequence, displacement, or habitat loss associated with decommissioning activity related to the Proposed Development will **not have a significant impact** on the pink-footed goose population using the area. Confidence in this prediction is near certain.

Red Kite

8.8.124 There is evidence of red kite occupying a territory within or in close proximity to the Site. Any potential effects associated with decommissioning are likely to be short-lived, less extensive compared with the effects associated with construction, and habitats will subsequently be restored. In addition to this, displacement owing to construction and operation of the Proposed Development are already likely to be well established by this point in time. As a consequence, displacement, or habitat loss associated with decommissioning activity related to the Proposed Development will **not have a significant impact** on the red kite population using the area. Confidence in this prediction is near certain.

Short-eared owl

8.8.125 There is evidence of short-eared owl occupying a territory close to the Site. Any potential effects associated with decommissioning are likely to be short-lived, less extensive compared with the effects associated with construction, and habitats will subsequently be restored. In addition to this, displacement owing to construction and operation of the Proposed Development are already likely to be well established by this point in time. As a consequence, displacement, or habitat loss associated with decommissioning activity related to the Proposed Development will **not have a significant impact** on the short-eared owl population using the area. Confidence in this prediction is near certain.

White-tailed Eagle

8.8.126 Any potential effects associated with decommissioning are likely to be short-lived, less extensive compared with the effects associated with construction, and habitats will subsequently be restored. In addition to this, displacement owing to construction and operation of the Proposed Development are already likely to be well established by this point in time. As a consequence, displacement, or habitat loss associated with decommissioning activity related to the Proposed Development will **not have a significant impact** on the white-tailed eagle population using the area. Confidence in this prediction is near certain.

8.8.127 While an active nest was recorded in the buffer zone to the south-east, there will be no disturbance effects due to the separation distance between the Proposed Development and the nest location. This is greater than the published disturbance distance (i.e. the distance at which disturbance will begin to occur).

8.9 Cumulative Effects

8.9.1 Cumulative impacts of wind farms on ornithological features may be categorised into two areas:

- larger scale impacts of displacement and / or disturbance; and
- increased mortality across a larger area due to collision risk.

8.9.2 Collision risk modelling is a broad-brush tool, the results of which provide an indication rather than a definitive risk calculation. Other factors such as disturbance and displacement, whether in the breeding season or winter, may carry as much weight, or more, in terms of realistic impacts.

8.9.3 The greatest theoretical risks of significant cumulative effects are on species of National or International importance from a high volume of wind farms being present in a relatively small area.

8.9.4 Current guidance suggests that the highest priority for cumulative impact assessment is for species that are declining and / or not in favourable conservation status, and that species of very high conservation importance or those vulnerable to wind farm developments should be targeted for cumulative assessments (SNH, 2012)[96].

8.9.5 The context in which cumulative impacts are considered also depends upon the ecology of the species in question. For example, it may be appropriate to consider cumulative collision risk to geese associated with a SPA within the context of their wider foraging range.

8.9.6 For other receptors, such as breeding waders, it may be appropriate to consider the impacts on the local population in the context of any planned wind farms in the immediate vicinity which have the potential to cause additional displacement on a much more localised population.

8.9.7 Cumulative impact assessments are often complicated by limited availability of ornithological impact assessments for other wind farm developments. Where this information is available, survey periods and methods may differ between sites.

[96] SNH. (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments. SNH, Battleby.

8.9.8 Furthermore, some wind farm developments may have been operational or in planning for many years, and thus data may no longer be valid due to age of data and / or changes in bird populations since the time of survey.

8.9.9 They may also have been assessed using different standards (for example, on older wind farm sites, collision risk avoidance rates may be different from those used currently and the EIA may not be explicit about what avoidance rate was used).

8.9.10 Furthermore, figures used to calculate cumulative collision risk generally do not take into account proposed mitigation or compensation. Therefore, it is reasonable to assume, where agreed with NatureScot, that implementation of mitigation and compensation measures will reduce the overall impacts.

8.9.11 A search was carried out for wind farms with three or more turbines with tip heights greater than 50m [97] within NHZ 10 Central Highlands, and where appropriate within NHZ 7 Northern Highlands and NHZ 21 Moray Firth, out to a distance of 40km from the Site.

8.9.12 **Table 8.28** shows the results of that search. Records of refusals more than two years old and projects which have been scoped more than five years ago have been omitted. Collision risk modelling data available is compared for the species for which collision risk assessment has been made for the Proposed Development.

Table 8.28: Overview of Wind Farm Developments within 40km of the Site

Site Name	Distance (km) and Direction from nearest turbine	County	Status	No. of Turbines	NHZ	Species under assessment for which collision risk modelling is available
Kyllachy	~ 3km north	Highland	Scoping	11	10	
Glen Kyllachy	4.7km north-west	Highland	Operational	20	10	Golden eagle Peregrine Red kite
Highland Wind Farm	~5km south-west	Highland	Scoping	24	10	
Farr	6.4km north-west	Highland	Operational	40	10	
Aberarder	11km west	Highland	Under Construction	12	10	Golden eagle
Dunmaglass	11.4km west	Highland	Operational	33	10	
Tom na Clach Extension	13.2km north-east	Highland	Approved	7	10	Golden eagle Hen harrier Red kite
Tom na Clach	13.4km north-east	Highland	Operational	13	10	Curlew Golden eagle Golden plover Hen harrier Peregrine Red kite
Moy	13.7km north	Highland	Operational	20	10	Golden plover
Lethen	16.8km north-east	Highland	Application	17	10	Curlew Golden eagle Hen harrier Greylag goose Pink-footed goose Red kite
Corriegarth 2	19.2km south-west	Highland	Consented	16	10	Golden eagle Golden plover Greylag goose Hen harrier Peregrine Pink-footed goose Red kite White-tailed eagle
Corriegarth	19.7km south-west	Highland	Operational	23	10	Golden eagle Peregrine
Balmore	23.4km north-east	Highland	Scoping	8	10	
Cairn Duhie Redesign	26.2km north-east	Highland	Application	16	10	Curlew Greylag goose Pink-footed goose
Cloiche	26.4km south-west	Highland	Consented	36	10	Golden eagle Golden plover Peregrine Red kite White-tailed eagle
Stronelairg	26.8km south-west	Highland	Operational	66	10	
Ourack	29.3km north-east	Highland	Application	18	10	Curlew Golden eagle Golden plover

[97] These parameters were selected because smaller developments are less likely to have quantitative data or may not even have an associated Environmental Statement or EIA Report.

Site Name	Distance (km) and Direction from nearest turbine	County	Status	No. of Turbines	NHZ	Species under assessment for which collision risk modelling is available
						Greylag goose Hen harrier Peregrine Pink-footed goose Red kite White-tailed eagle
Dell	29.8km south-west	Highland	Consented	14	10	Golden eagle
Dell Redesign	29.9km south-west	Highland	Scoping	9	10	Golden eagle
Berry Burn	33.9km north-east	Moray	Operational	29	10	
Hill of Glaschyle	34.3km north-east	Moray	Operational	12	10	
Berry Burn Extension	36.2km north-east	Moray	Approved	9	10	Hen harrier

8.9.13 **Tables 8.29a** and **8.29b** provide a summary of the results of the cumulative annual collision risks. Collision risk estimates were adjusted where avoidance rates had been changed subsequent to the rate being estimated. Figures are quoted to three decimal places and no values approximating to zero are actually zero values.

Table 8.29a: Collision risk estimates for species assessed at the Proposed Development and for Wind Farms in NHZ 10

Wind Farm Status and Name	Curlew	Golden eagle	Golden plover	Greylag goose	Hen harrier
Clune	0.135	0.277	0.028	1.389	0.017
Operational					
Glen Kyllachy		0.044			
Tom na Clach	0.150	0.016	0.064		0.012
Moy			0.06		
Corriegarth		0.11			
Under Construction					
Aberarder		0.11			
Consented					
Corriegarth 2		0.093	0.014	0.029	0.002
Cairn Duhie Redesign	0.060			0.427	
Cloiche		0.1 (west) 0.08 (east)	0.01 (west only)		
Dell		0.029 (worst case scenario)			
Berry Burn Extension					0.001
In Planning					
Tom na Clach Extension		0.012			0.006
Ourack	0.000	0.14	0.005	0.01	0.02
Dell Redesign		0.199 (worst case scenario)			
Refused					
Lethen	0.12	0.02		1.14	0.03

Table 8.29b: Collision risk estimates for species assessed at the Proposed Development and for Wind Farms in NHZ 10

Wind Farm Status and Name	Peregrine	Pink-footed goose	Red kite	White-tailed eagle
Clune	0.024	1.881	0.681	0.97
Operational				
Glen Kyllachy	0.019		0.484	
Tom na Clach	0.011	0.580	0.114	
Moy				
Corriegarth	0.01			
Under Construction				
Aberarder				
Consented				
Corriegarth 2	0.020	0.003	0.222	0.312
Cairn Duhie Redesign		0.582		
Cloiche	0.03 (west) 0.02 (east)		0.01 (west) 0.07 (east)	0.14 (west) 0.03 (east)
Dell				
Berry Burn Extension				
In Planning				
Tom na Clach Extension			0.115	
Ourack	0.01	0.115	0.025	0.055
Dell Redesign				
Refused				
Lethen		1.22	0.12	

8.9.14 **Table 8.30** provides the cumulative annual estimates for the species considered. Numbers have been rounded to three decimal places where appropriate.

Table 8.30: Summary of collision risks in NHZ 10

Category	Curlew	Golden eagle	Golden plover	Greylag goose	Hen harrier	Peregrine	Pink-footed goose	Red kite	White-tailed eagle
The Proposed Development									
Annual Collision Rate	0.135	0.277	0.028	1.389	0.017	0.024	1.881	0.681	0.97
Estimated no. of collisions over 40 years	5.4	11.08	1.12	55.56	0.68	0.96	75.24	27.24	38.8
Operational, Under Construction and Consented Total									
Annual Collision Rate	0.21	0.582	0.148	0.456	0.015	0.11	1.165	0.9	0.482
Estimated no. of collisions over 40 years	8.4	23.28	5.92	18.24	0.6	4.4	46.6	36	19.28
Operational, Under Construction, Consented and Proposed Development									
Annual Collision Rate	0.345	0.859	0.199	1.845	0.032	0.134	3.046	1.581	1.452
Estimated no. of collisions over 40 years	13.8	34.36	7.96	73.8	1.28	5.36	121.84	63.24	58.08
In Planning									
Annual Collision Rate	0.000	0.351	0.005	0.01	0.026	0.01	0.115	0.14	0.055
Estimated no. of collision over 40 years	0.000	14.04	0.2	0.4	1.04	0.4	4.6	5.6	0.22

Curlew

8.9.15 Population estimates for this species within NHZ 10 come to 811 breeding pairs, and 249 and 385 breeding pairs for NHZ 7 and NHZ 21 respectively, which would suggest a regional population of 1,445 breeding pairs (Wilson, 2015)[98].

8.9.16 Collision risks at the Proposed Development equate to approximately one collision every 7.4 years. Adding annual collision estimates of operational, wind farm developments under construction and approved wind farm developments to that of the Proposed Development yields an estimate of around a third of a bird every year which would **not constitute a significant negative effect** on the regional population. Confidence in this assessment is considered near certain.

Golden Eagle

8.9.17 The population estimate for NHZ 10 is estimated at 12 occupied breeding territories, and 43 and 0 occupied breeding territories respectively for NHZ 7 and 21, resulting in an estimate of 55 occupied breeding territories for the region (Wilson, 2015)[99].

8.9.18 More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[100] has 17 occupied territories out of 21 checked in the Inverness-shire area in 2022.

8.9.19 Collision risks at the Proposed Development equate to approximately one collision every 3.5 years. Adding annual collision estimates of operational, wind farm developments under construction and approved wind farm developments to that of the Proposed Development yields an estimate of just less than a single bird every year.

8.9.20 PVA was carried out for the cumulative risk, and as with all other models (**Technical Appendix 8.4: Ornithology Modelling**) the population declined. However, as with the assessment for risk associated with the Proposed Development solely, the cumulative collision risk estimate is an overestimate which does not take into account the behaviour response of Golden eagle to wind farm developments (Walker, McGrady, McCluskie, Madders, & Mcleod, 2016[101] Fielding and Haworth (2011)[102]), and the displacement that results which would reduce considerably the actual operational collision risk.

[98] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[99] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[100] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.
[101] Walker, D., McGrady, M., McCluskie, A., Madders, M. and Mcleod, D. R. A. (2016). Resident Golden Eagle ranging behaviour before and after construction of a windfarm in Argyll. Scottish Birds 24-40.
[102] Fielding, A.H. and Haworth, P.F. (2011). Edinbane Windfarm: Monitoring Report 2007-2010. Report for Highland Regional Council.

8.9.21 Therefore, it is considered that the cumulative collision risk for this species does **not constitute a significant negative effect** on the regional population. Confidence in this assessment is considered probable.

Golden Plover

8.9.22 Population estimates for this species within NHZ 10 come to 2,702 breeding pairs, and 3,009 and 94 breeding pairs for NHZ 7 and 21 respectively, which would suggest a regional population of 5,805 breeding pairs (Wilson, 2015)[103].

8.9.23 Collision risks at the Proposed Development equate to approximately one collision every 35.7 years. Adding annual collision estimates of operational, wind farm developments under construction and approved wind farm developments to that of the Proposed Development yields an estimate of a fifth of a bird every year which would **not constitute a significant negative effect** on the regional population. Confidence in this assessment is considered near certain.

Greylag Goose

8.9.24 While no NHZ population estimate exists for this species, Mitchell *et al.* (2011)[104] provides a Scottish wintering population estimate of 47,405 based on surveys undertaken in 2008 and 2009.

8.9.25 Collision risk at the Proposed Development equates to approximately just less than 1.5 collisions every year. Adding annual collision estimates of operational, wind farm developments under construction and approved wind farm developments to that of the Proposed Development yields an estimate of just less than two birds every year. As the over-whelming majority of collision risks would be likely to fall on the wider population staging through the area on migration, it is considered that this would **not constitute a significant negative effect** on the national / regional population. Confidence in this assessment is considered near certain.

8.9.26 With regards barrier / displacement effects, while there is evidence of birds avoiding flying through / over wind farms (Rees, 2012)[105], it does not consistently occur. Even if flight paths were offset to avoid the Proposed Development and other wind farms, while there may be a slight energetic constraint, this is considered to be **not significant**.

Hen Harrier

8.9.27 Due to hen harrier being an Annex 1, Schedule 1 and 1A, SBL listed species, red-listed on BoCC 5, and a species considered to be at risk from wind farms (SNH, 2018a)[106], cumulative effects are discussed here, even though very low levels of flight activity were recorded on the Site and as a result, the species was not brought forward to full assessment.

8.9.28 The population estimate for NHZ 10 is estimated at 18 breeding pairs, and 18 and one breeding pairs respectively for NHZ 7 and 21 (Wilson, 2015)[107]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[108] has zero occupied territories out of seven checked in the Inverness-shire area in 2022.

8.9.29 Collision risks at the Proposed Development equate to approximately one collision every 59 years. Adding annual collision estimates of operational, wind farm developments under construction and approved wind farm developments to that of the Proposed Development yields an estimate of a single bird every 31.25 years which would **not constitute a significant negative effect** on the regional population.

8.9.30 There is little evidence of displacement of non-breeding hen harriers (Haworth & Fielding, 2013)[109]; as such and taking into account the low levels of activity over the Proposed Development, the effect of cumulative displacement would be **not significant**. Confidence in this assessment is considered near certain.

Peregrine

8.9.31 Due to peregrine being an Annex 1, Schedule 1, and SBL listed species and a species considered to be at risk from wind farms (SNH, 2018a)[110], cumulative effects are discussed here, even though very low levels of flight activity were recorded on the Site and as a result, the species was not brought forward to full assessment.

[103] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[104] Mitchell, C., Griffin, L., Trinder, M., Neweth, J., & Urquhart, C. (2011). The status and distribution of summering Greylag Geese *Anser anser* in Scotland 2008–09. Bird Study 58.
[105] Rees, E. C. (2012). Impacts of wind farms on swans and geese: A review. Wildfowl, Volume 62, pp. 37-72.
[106] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.
[107] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[108] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.
[109]
[110] SNH. (2018a). Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Out With Designated Areas. NatureScot, Battleby.

8.9.32 The population estimate for NHZ 10 is estimated at seven breeding pairs, and 15 and six breeding pairs respectively for NHZ 7 and 21 (Wilson, 2015)[111]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[112] has three occupied territories out of 17 checked in the Inverness-shire area in 2022.

8.9.33 Collision risks at the Proposed Development equate to approximately one collision every 41.5 years. Adding annual collision estimates of operational, wind farm developments under construction and approved wind farm developments to that of the Proposed Development yields an estimate of a single bird approximately every 7.5 years which would **not constitute a significant negative effect** on the regional population.

8.9.34 There is little evidence of displacement of non-breeding peregrine; as such and taking into account the low levels of activity over the Proposed Development, the effect of cumulative displacement would be **not significant**. Confidence in this assessment is considered near certain.

Pink-footed Goose

8.9.35 For NHZ 10, the peak count of pink-footed goose is estimated at seven (Wilson, 2015)[113]; for NHZs 7 and 21 the peak count is four and 35,370 respectively. A sensitivity mapping study of the distribution of pink-footed goose (Mitchell, 2012)[114] showed an absence of birds in winter from the NHZ area.

8.9.36 Collision risk at the Proposed Development equates to approximately just less than two collisions every year. Adding annual collision estimates of operational, wind farm developments under construction and approved wind farm developments to that of the Proposed Development yields an estimate of approximately three birds every year. As the over-whelming majority of collision risks would be likely to fall on the wider population staging through the area on migration, it is considered that this would **not constitute a significant negative effect** on the national / regional population. Confidence in this assessment is considered near certain.

8.9.37 With regards to barrier / displacement effects, while there is evidence of birds avoiding flying through / over wind farms (Rees, 2012)[115], it does not consistently occur. Even if flight paths were offset to avoid the Proposed Development and other wind farms, while there may be a slight energetic constraint, this is considered to be **not significant**.

Red Kite

8.9.38 The population estimate for red kite for NHZ 10 is estimated at zero breeding pairs, and nine and 50 breeding pairs respectively for NHZ 7 and 21 (Wilson, 2015)[116], resulting in an estimate of 59 breeding pairs for the region.

8.9.39 More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[117] has 11 occupied territories out of 15 checked in the Inverness-shire area in 2022.

8.9.40 Collision risks at the Proposed Development equate to approximately one collision every 1.5 years. Adding annual collision estimates of operational, wind farm developments under construction and approved wind farm developments to that of the Proposed Development yields an estimate of approximately 1.6 birds every year.

8.9.41 PVA modelling for this species (**Technical Appendix 8.4**) shows that this additional mortality can be absorbed by the regional population without any adverse effects. The population is growing and expanding too strongly for this level of mortality to reverse it. As such, cumulative collision risk is not considered to be significant and confidence in this assessment is near certain.

White-tailed Eagle

8.9.42 The population estimate for white-tailed eagle for NHZ 10 is estimated at zero territorial pairs, and one and zero territorial pairs respectively for NHZ 7 and 21 (Wilson, 2015)[118]. More recent data from the Scottish Raptor Monitoring Scheme Annual Report 2021 & 2022 (Challis *et al.*, 2023)[119] has one occupied territory out of one checked in the Inverness-shire area in 2022.

8.9.43 Collision risks at the Proposed Development equate to approximately just less than one collision every year. Adding annual collision estimates of operational, wind farm

[111] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[112] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.
[113] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[114] Mitchell, C. (2012). Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge. 108pp.
[115] Rees, E. C. (2012). Impacts of wind farms on swans and geese: A review. Wildfowl, Volume 62, pp. 37-72.
[116] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[117] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.
[118] Wilson, M. W., Austin, G. E., Gillings, S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. Scottish Windfarm Bird Steering Group (SWBSG) Commissioned Report No. 1504.
[119] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). Scottish Raptor Monitoring Scheme Report 2021 & 2022. BTO Scotland, Stirling.

developments under construction and approved wind farm developments to that of the Proposed Development yields an estimate of approximately 1.5 birds every year.

8.9.44 PVA modelling for this species (**Technical Appendix 8.4** refers) has shown that despite the relatively high level of collision risk observed for this species, the population continued to grow. This reflects the buoyant state of the Scottish white-tailed eagle population, as demonstrated in Samson, Evans & Roos (2016)[120], which indicated that the Scottish white-tailed eagle was in the period of rapid expansion following reintroduction.

8.9.45 Therefore, it is considered that the cumulative collision risk for this species does **not constitute a significant negative effect** on the regional population. Confidence in this assessment is considered near certain.

8.10 Summary of Residual Effects

8.10.1 The potential effects of the Proposed Development on ornithological receptors found within and in close vicinity to the Site have been assessed. Taking into account the successful implementation of the mitigation measures contained within the CEMP and HMP, there will be **no significant residual effects** in terms of the EIA Regulations (**Table 8.31** refers).

Table 8.31: Summary of Residual Effects

Receptor	Evaluation	Construction Phase		Operational Phase		Decommissioning Phase	
		Habitat Loss	Disturbance	Disturbance	Collision Risk	Habitat Loss	Disturbance
Kinveachy Forest SSSI	National	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant
Curlew	Local	Negligible – not significant	Minor – not significant	Minor – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant
Golden Eagle	Regional	Negligible – not significant	Negligible – not significant	Negligible – not significant	Minor – not significant	Negligible – not significant	Negligible – not significant
Golden Plover	Local	Negligible – not significant	Minor – not significant	Minor – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant
Greylag Goose	Local	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant
Merlin	Local	Negligible – not significant	Minor – not significant	Minor – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant
Pink-footed Goose	Less than local	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant
Red Kite	County	Negligible – not significant	Negligible – not significant	Negligible – not significant	Minor – not significant	Negligible – not significant	Negligible – not significant
Short-eared owl	Regional	Negligible – not significant	Minor – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant	Negligible – not significant
White-tailed Eagle	Regional	Negligible – not significant	Negligible – not significant	Negligible – not significant	Minor – not significant	Negligible – not significant	Negligible – not significant

8.11 Conclusions

8.11.1 The baseline populations of the Site have been described and assessed to identify important ornithological receptors. Proposed mitigation measures through the CEMP and HMP were identified to manage the potential impacts of the Proposed Development on those ornithological receptors during construction and operation.

8.11.2 The residual effects, taking into account construction and operation, were then assessed to establish if they would have significant effects on the ornithological receptors and a cumulative assessment was carried out to identify any regional level impacts which could become significant as a result of the Proposed Development.

8.11.3 No significant residual effects were identified and it is therefore concluded that the Proposed Development can proceed without having an adverse effect on the ornithological receptors on and around the Proposed Development.

[120] Samson, A., Evans, R. & Roos, S. (2016). Population and future range modelling of reintroduced Scottish white-tailed eagles (*Haliaeetus albicilla*). SNH Commissioned Report No. 898. SNH, Inverness.