atmos CONSULTING

Environmental Impact Assessment Report

Swarclett Wind Farm

Chapter 7: Ornithology

Swarclett Wind Energy Limited

wind2

June 2024

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Glossary of Terms

Term	Definition
The Applicant	Swarclett Wind Energy Limited
Environmental and Planning Consultant	Atmos Consulting Limited
Environmental Impact Assessment	Environmental Impact Assessment (EIA) is a means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development.
Environmental Impact Assessment Regulations	The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations)
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations
Proposed Development	Swarclett Wind Farm
Proposed Development Footprint	The area within which the Proposed Development will be located.
Proposed Development Site	The full application boundary, i.e. the red line boundary (Figure 1-1 Site Location).
Survey area	The area within which one or more ornithology survey was carried out. Show in Figure 7.4
Turbine envelope	A term describing a buffer of 500m around turbine placements.

List of Abbreviations

Abbreviation	Description
BoCC	Birds of Conservation Concern. Birds with these designations are listed as red or amber depending on their level of endangerment.
BTO	British Trust for Ornithology
CEMP	Construction Environment Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CRM	Collision Risk Modelling
cWHS	Candidate World Heritage Site
DCMS	Department for Digital, Culture, Media and Sport
EcIA	Ecological Impact Assessment
EnvCoW/ECoW	Ecological/Environmental Clerk of Works
EIA	Environmental Impact Assessment
HRSG	Highland Raptor Study Group
JNCC	Joint Nature Conservation Committee
NS	NatureScot
RSPB	Royal Society for the Protection of Birds
SBL	Scottish Biodiversity List
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
THC	The Highland Council
WCA	Wildlife and Countryside Act (UK) 1981
WeBS	Wetland Bird Survey
ZOI	Zone of Influence

7 Ornithology

7.1 Introduction

This chapter describes and evaluates the current ornithological nature conservation interests in relation to the Proposed Development and its survey areas. The extent of the survey area depends on the species in question as stipulated in guidance provided by NatureScot (NS), (SNH, 2017). An assessment is then made in relation to the direct/indirect habitat loss and disturbance/displacement effects during construction, and the disturbance/displacement and collision risk effects during operation (including cumulatively). Only receptors above a certain value have been assessed.

7.2 Legislation and Policy

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

- The Conservation of Wild Birds (Directive 2009/147/EC, the 'Birds Directive');
- Wildlife and Countryside Act 1981 (as amended) (WCA);
- Conservation (Natural Habitats & c.) Regulations 1994 (as amended in Scotland);
- Nature Conservation (Scotland) Act 2004 and the Scottish Biodiversity List (SBL) contained within the Act;
- Ramsar Convention on Wetlands;
- Highland Biodiversity Action Plan; and
- Birds of Conservation Concern 5 (BoCC), (Stanbury *et al*., 2021).

For full details of relevant legislation and policy documents please refer to Section 2 of Technical Appendix 7-1.

7.2.1 Ornithological Guidance and Information Sources

NS has published a number of guidance documents related to the assessment of impacts of wind farms on bird populations. The following list, which includes guidance or information produced by NS and other organisations, was used to inform the ornithological assessment:

- Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action (NS, 2000);
- Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Outwith Designated Areas (NS, 2018a);
- Assessing the Cumulative Impacts of Onshore Wind Energy Developments (NS, 2012);
- Assessing impacts to pink-footed and greylag geese from small-scale wind farms in Scotland (NS, 2014);
- Assessing Connectivity with Special Protection Areas (NS, 2016a);
- Environmental Statements and Annexes of Environmentally Sensitive Bird Information (NS, 2016b);
- Avoidance Rates for the Onshore SNH Bird Wind Farm Collision Risk Model (NS, 2016c);

- Recommended bird survey methods to inform impact assessment of onshore wind farms (NS, 2017b); and
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018).

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

- The Birds of Scotland (Forrester *et al.*, 2007);
- National Heritage Zone Bird Population Estimates (Wilson *et al.*, 2015);
- Scottish Raptor Monitoring Scheme Annual Report 2020 (Challis *et al.*, 2022).

Data on local bird records was sought from the following sources to support the ornithological assessment:

- Royal Society for the Protection of Birds (RSPB) Scotland;

For reference, Highland Raptor Study Group (HRSG) no longer provide data to environmental consultancies.

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

- NS Sitelink website;
- MAGIC online GIS tool; and
- Joint Nature Conservation Committee (JNCC) website.

7.3 Consultation

Pre-application consultation was undertaken in November 2021, followed by a formal scoping exercise in March 2022 as described in Chapter 2: EIA Approach and Methodology. In relation to avian ecology and nature conservation, scoping opinion was sought from The Highland Council (THC), NS and RSPB.

Table 7-1 provides a summary of the key issues relating to avian ecology raised during Pre-Application consultation (November 2021) and during scoping (March 2022). Any additional scoping communications with key stakeholders which took place outside of the formal Scoping process are also detailed.

Table 7-1: Consultee Responses Relating to Avian Ecology

Consultee	Document and date	Responses Relevant to Ornithology	Comment
NS	Consultation Response 5/5/2020	Recommend that all survey and assessment is carried out in accordance with bird survey guidance	Survey work followed NS guidance and is described in Technical Appendix 7-1 Section 3.2. Assessment followed a combination of CIEEM methodology and NS guidance as set out in Section 7.4
NS	Consultation Response 5/5/2020	**Caithness Lochs SPA** At the time of consultation there was insufficient information to show that there would not be an adverse impact on the Caithness Lochs SPA	

Consultee	Document and date	Responses Relevant to Ornithology	Comment
		integrity. NatureScot indicated the following would be required: - A further winter of vantage point survey work to cover the period from start of October to end of April. This should follow bird survey guidance and ensure adequate coverage of the site - Collision risk modelling should be carried out to include a cumulative assessment of collision risk - An additional winter of feeding goose surveys with the survey area expanded to include favoured feeding areas for Greylag geese in the Hoy-Olrig area and for Whooper swans in the area around Durran/Loch of Durran	Survey work was carried out in the winter of 2020/21 between October 2020 and May 2021 using methodology from NS guidance - Technical Appendix 7-1 CRM has been carried out in Section 7.10 with a Cumulative Assessment carried out in Section 7.11 The winter goose survey area was expanded northwards to cover the Durran/Loch of Durran and Olrig (see Figures 7-1-19 through 7-1-21)
NS	Consultation Response 5/5/2020	**Caithness and Sutherland Peatlands SPA and Ramsar site** Noted that the SPA appeared to be approximately 8km from the Proposed Development and not as in the consultation report, but that the proposed surveys appeared to follow guidance. Noted that the occurrence of Common scoter on surveys was unusual and that any risk of collision would be significant; however also identified that the record was from January so early for breeding birds	The distance to the SPA had been incorrectly given in the referenced document. Surveys were carried out as proposed. We agree that the Common scoter is unlikely to form part of the SPA population and is more likely a wintering bird found inland (Section 7.6.2)
NS	Consultation Response 5/5/2020	**Wider countryside birds** Given suitability of habitat and previous records in the area survey and assessment for roosting Hen harriers may also be required	Specific Hen harrier roosting surveys were not carried out, but there was also no indication of activity suggesting roosts were present. Given the wintering goose work undertaken over the wider area and at times when roosting Hen harrier would be present, it is concluded no roosts were present
THC	Pre-Application, 03/11/2021	**Heritage Sites**. Highland-wide Local Development Plan Policy 57 considers impacts on natural, built and cultural heritage designations and features. All development will be assessed taking into account the level of importance and type of heritage features, the form and scale of development and any impact on the feature and its setting. Of particular relevance are those landscape and	Noted.

Consultee	Document and date	Responses Relevant to Ornithology	Comment
		other natural, built and cultural heritage features in proximity to the proposal identified in the constraints maps provided.	
THC	Pre-Application, 03/11/2021	**World Heritage Site (tentative) and The Peatlands of Caithness and Sutherland – Management Strategy,** The Flow Country is on the tentative list for World Heritage Site status and as part of the process for the bid for it to become a World Heritage Site. In 2019 the Peatlands Partnership submitted a Technical Evaluation of The Flow Country to the UK Government's Department for Digital, Culture, Media and Sport (DCMS). DCMS has now issued a decision to nominate The Flow Country as the UK's next candidate for World Heritage Site status. The next and final stage of the process will be to submit a full nomination to UNESCO, who would determine whether or not The Flow Country meets the criteria for World Heritage Site status. It is worth noting that SPP (2014) indicates WHS as part of Group 2 in the spatial framework.	Since this commentary was provided, the application for the Flow Country World Heritage Site (WHS) has been made and so account was taken of impacts on the Candidate WHS (cWHS) which have been ruled out of detailed assessment in Table 7-25,Section 7.7
NS	Pre-Application, 03/11/2021	**SPA goose roost consideration** The proposal lies between SPA roost lochs (e.g. Loch Scarmclate and Loch Heilen) and between the SPA and key feeding areas for geese and swans. The proposal site also appears to be within suitable feeding habitat. Therefore, for any future planning application in this area, it will be very important to consider the potential for: – Collision risk (to birds using the wind farm site and flying through it); – Disturbance and displacement impacts (of birds from feeding areas); and – Potential barrier effects to birds using normal routes to and from feeding and roosting sites.	Impacts on qualifying species of the Caithness Lochs SPA are addressed in Sections 7.9.2 and 7.10.2 and include consideration of disturbance, displacement, collision risks and barrier effects on SPA populations.
NS	Pre-Application, 03/11/2021	**Protected species** The proposal site has the potential to support a range of European and nationally protected species including (but not limited to): otter, bats and Breeding Birds.	Non-avian receptors are considered in Chapter 6: Ecology and supporting documents. Technical Appendix 7-1 details the results of the ornithology surveys, including Breeding Birds.
NS	Pre-Application, 03/11/2022	**Natural heritage zone based assessment** Impacts to SPA species should be assessed against the conservation objectives for the site. Impacts to wider countryside species (i.e. those not connected to a protected area) should be assessed against the relevant Natural Heritage Zone (NHZ).	Noted. Impacts on qualifying species of designated sites and on other assessed species are discussed in Sections 7.9.2, and 7.10.2.
NS	Pre-Application, 03/11/2022	**Cumulative Impact assessment, general** The cumulative impact of a new wind farm in this location will also need to be fully considered in relation to birds and further information is available	Noted. Cumulative Impact Assessment is addressed in Section 7.11

Consultee	Document and date	Responses Relevant to Ornithology	Comment
		from: https://www.nature.scot/guidance-assessing-cumulative[1]impacts-onshore-wind-farms-birds. Where a collision risk is identified, NS would be happy to advise on the appropriate developments and figures to include in a cumulative assessment.	
NS	Pre-Application, 03/11/2022	**Caithness Lochs SPA** **Cumulative impact assessment** Avoiding impacts to the SPA should be a key consideration in the design and layout of the wind farm. Where impacts are predicted, a thorough and detailed assessment in context of the SPA's conservation objectives will be required. This assessment should consider the impact of the proposal as a single development and cumulatively with other developments affecting this SPA.	Impacts on qualifying species of the Caithness Lochs SPA are addressed in Sections 7.9.2, and 7.10.2 Cumulative Impact Assessment is addressed in Section 7.11
NS	Pre-Application, 03/11/2022	**Survey work (context: footprint change)** NS understands survey work has been completed for this proposal to support such an assessment. Without further details, NS cannot comment on the suitability of these surveys at this time, but would be happy to provide further advice once this information is available.	This comment was in relation to the initial design of four turbines. Initial survey work was supplemented by a repeat of ornithological surveys undertaken in March – August 2023. Technical Appendix 7-1 details the results of all the ornithology surveys.
NS	Pre-Application, 03/11/2022	**Met mast installation** It is also understood that the proposal includes the installation of a meteorological mast. If a guyed mast is proposed, NS advises the guy wires are appropriately marked with bird deflectors to increase their visibility to birds. Deflectors should be regularly maintained and inspected each year to ensure they remain in place for the lifetime of the mast. In this case, NS advises these inspections are carried out in early September, prior to the wintering period for SPA geese and swans.	Noted. This comment was in relation to the initial design of four turbines and a met mast. The proposal has now changed to consist of two turbines and battery storage.
NS	Pre-Application, 03/11/2022	**Caithness and Sutherland Peatlands SPA** The proposal lies approximately 8 km from this SPA, protected for its upland Breeding Birds. The turbines will lie outside core foraging range for the majority of species associated with this SPA. However, if diver activity is identified during survey work, connectivity with this SPA should be considered.	Divers have not been recorded during survey and Caithness and Sutherland Peatlands and other qualifying species at this designated site have been ruled out of assessment as described in Section 7.7.
NS	Pre-Application, 03/11/2022	**Ornithology guidance** Ornithology Survey work should follow NS recommended guidance, available at: https://www.nature.scot/professional-advice/planning-and-development/planning-anddevelopment-advice/renewable-	Survey work followed NS guidance and is described in Technical Appendix 7-1 Section 3.2.

Consultee	Document and date	Responses Relevant to Ornithology	Comment
		energy/onshore-wind-energy/wind-farm-impacts-birds.	
THC	Scoping, 28/03/2022,	**EIA report; Enhancement and Mitigation** An EIAR chapter covering ecology, habitats and ornithology will be required. This must provide a baseline survey of the bird interests on site. It needs to be established which species are present on the site, and where. Habitat enhancement and mitigation measures should be detailed, in the contexts of both biodiversity and conservation. Details of any habitat enhancement should be provided.	Chapter 6: Ecology and associated technical appendices describes the work to assess the impacts on non-avian ecological receptors. Section 7.8 details works for mitigation and enhancement with regards to avian receptors.
THC	Scoping, 28/03/2022,	**Protected Species** The presence of protected species such as Schedule 1 Birds must be included and considered as part of the planning application process, not as an issue which can be considered at a later stage.	Technical Appendix 7-1 details the results of the ornithology surveys. Section 7.6.2 includes all Schedule 1 and Annex I protected bird species recorded on site.
THC	Scoping, 28/03/2022,	**Mitigation for effects on designated sites** The EIAR should address the likely impacts on the nature conservation interests of all the designated sites in the vicinity of the Proposed Development. It should provide proposals for any mitigation that is required to avoid these impacts or to reduce them to a level where they are not significant. The potential impact of the development proposals on other designated areas such as SSSI (Site of Special Scientific Interest) should be carefully and thoroughly considered and, where possible, appropriate mitigation measures outlined in the EIAR.	Impacts on qualifying species of designated sites are addressed in Sections 7.9.2, and 7.10.2. Mitigation and Enhancement is discussed in Section 7.8.
NS	Scoping, 28/03/2022	**Caithness Lochs SPA** The proposal lies approximately 1.5 km from this SPA. Due to the connectivity with this SPA, a Habitat Regulations Appraisal (HRA) will be required and any direct or indirect impacts to its features will need to be fully considered as part of the EIA process. Avoiding impacts to this site should be a key consideration in the design and layout of the wind farm. Assessment will need to consider collision risk and displacement and disturbance effects as well as barrier effects to birds travelling to and from their feeding/roosting areas	Impacts on qualifying species of designated sites are addressed in Sections 7.9.2, and 7.10.2. Technical Appendix 6-5 presents information to inform the Habitats Regulation Appraisal. Impacts assessed did include those detailed – Section 7.8 and 7.9
NS	Scoping, 28/03/2022	**Loch of Durran SSSI** NS also advise that Loch of Durran SSSI is known to be an important feeding area for Whooper swans, associated with the Caithness Lochs SPA.	Noted
NS	Scoping, 28/03/2022	**Caithness and Sutherland Peatlands SPA** The Proposed Development will lie outside the core foraging area for the majority of SPA species	No diver activity was recorded; impacts on the SPA have therefore not

Consultee	Document and date	Responses Relevant to Ornithology	Comment
		with the exception of divers. Should activity by divers be identified during survey work then connectivity with the SPA should be considered	been assessed.

No Scoping response was received from RSPB Scotland.

7.4 Methodology

7.4.1 Desk Study

A desk study was undertaken to identify nature conservation designations and records of protected or otherwise notable species in the local area. Only those features that relate to ornithology are considered in this chapter, with non-avian ecology data being presented in Chapter 6: Ecology.

The review of online data was undertaken in October 2023 to gather details of statutory nature conservation designations, Special Protection Areas (SPAs), Ramsar and Sites of Special Scientific Interest (SSSIs), up to 10km from the Proposed Development Site and up to 20 km of the Proposed Development Site where potential impacts on geese were concerned.

In addition, data relating to the usage of the Caithness Lochs SPA was also the subject of data search, to provide context to the data recorded during the surveys carried out to inform the assessment of the Proposed Development. Information on this is provided in the species accounts (Section 7.6.2).

A search of the NBN Atlas was made for the last 10 years within a 5 km radius of the Proposed Development. The results of species records are presented in section 4.1.2 of Technical Appendix 7.1

Data would have been requested from the Highland Raptor Study Group, but they are not currently providing data to environmental consultancies.

Data received from the RSPB in September 2023 included records of the following species: Curlew, Greylag goose, Lapwing, Oystercatcher, Pink-footed goose, Redshank and Snipe.

7.4.2 Field Survey

A detailed description of survey methods is provided in Technical Appendix 7-1. Table 7-2 provides an overview of the surveys carried out. Data is presented in this EIAR for the period September 2019 to August 2023 for the survey areas appropriate for the species under consideration. Vantage point locations and viewsheds are shown in Figure 7-2.

Table 7-2: Summary of Ornithology Field Surveys

Survey	Non-Breeding Season 2019/2020	Breeding Season 2020	Non-Breeding Season 2020/2021	Breeding Season 2021	Breeding Season 2023
Vantage Point (VP) Surveys (1 VP although with a change of position,	X	X	X	X	X

Survey	Non-Breeding Season 2019/2020	Breeding Season 2020	Non-Breeding Season 2020/2021	Breeding Season 2021	Breeding Season 2023
an average of 6 hours per month per VP), (NS, 2017)					
Breeding Bird Surveys (using Brown & Shepherd amended methodology, (Brown & Shepherd, 1993) as modified under guidance (NS, 2017))		X		X	
Breeding Raptor Surveys, (NS, 2017)		X		X	X
Wintering Goose Surveys (NS, 2017)	Oct 2019-May 2020		Oct 2020-May 2021		Apr 2023 – May 2023

Survey areas are defined by buffers around the development footprint, for Breeding Bird Surveys to the survey area buffer is 500m, for Breeding Raptors it is 2km. Wintering goose survey areas were not so deterministically defined but initially, were based on a radius around the Proposed Development Site which was then amended following consultation with NS expanding from a 1km footprint around an earlier iteration of the Proposed Development Site to encompass an area extending roughly between Loch Scarmclate in the south and just south of Castletown in the north (see Technical Appendix Figures 7-1-19 to 7-1-21 inclusive).

7.4.3 Collision Risk Modelling

The general methodology used to predict collision risk for birds using the wind farm airspace is provided by NS (NS, 2000).

Collision Risk Modelling (CRM) was carried out for the six species for which levels of flight activity recorded over the Survey Area was considered sufficient to warrant analysis. The predictable model was applied only to the two complete winters of survey (2019-2020 and 2020-2021) as it was considered that the partial data from 2023 would have introduced biases in the data. The predictable model was carried out for goose and swan species. The random model was used for wader species and all VP data was used (2019-2023). Descriptions of the methodology used are given below.

In this instance, CRM has been undertaken for the following species (Tables 7-4 and 7-5) that showed sufficient levels of flight activity over the Proposed Development during the survey period:

- Greylag goose *Anser anser*;
- Pink-footed goose, *Anser brachyrhynchus*;
- Whooper swan *Cygnus cygnus*;
- Snipe, *Gallinago gallinago*;
- Curlew, *Numenius arquata*;
- Lapwing *Vanellus vanellus*;

A model (Forsythe, et al., 1995) was used to calculate the daytime length as a function of latitude (58° 32' 20" N for the centre of the Proposed Development) and date (2019, 2020, 2021 and 2023). Table 7-3 presents the turbine parameters used for the CRM.

Table 7-3: Turbine Parameters

Turbine Parameter	Dimension	Unit
Number of Turbines	2	
Blades per Turbine	3	
Hub height	83.5	metres
Rotor Radius	66.5	metres
Maximum Chord	4	metres
Pitch	0	degrees
Rotation Period	4.55	seconds
Proportion Operational	0.85	

Random Collision Risk Model

In summary, for the three wader species for which random movements were assumed the following steps were taken for 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 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 vantage point, defined as the observed 'at risk' activity levels divided by total observation time and area observed, giving the occupancy per unit time and 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 wind development site, based on the Proposed Development 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); 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 avoiding action;
- 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; and
- Avoidance rates used were in accordance with NS guidance (NS, 2016c).

The predicted mortality through collision is dependent on a number of variables, including flight activity within viewsheds, 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.

The following assumptions were made for the various species:

- A daylight calculator was used to produce figures for the total daylight period at the Proposed Development;
- Biometric data (bird length and wingspan) for the various species were obtained from the BTO (British Trust for Ornithology) webpage, (BTO, 2020)
- An assessment was made on the months active within the Survey Area for each species, with some species resident and others seasonal visitors. All species were considered active during the day only; and
- Flight speed data taken from (Alerstam, et al., 2007)

Table 7-4 presents a summary of the model used for each species, biometric parameters, avoidance rates and the seasons during which the species was present In the Survey Area.

Table 7-4: Random CRM Biometric Parameters

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	0.90	16.3	0.980	March-July	2407.23	0	2407.23	daylight hours only	Flapping
Lapwing	0.3	0.84	12.8	0.98	the year	4517.749	0	4517.75	daylight hours only	Flapping
Snipe	0.26	0.46	17.1	0.98	The year	4511.32	0	4511.32	daylight hours only	Flapping

CRM for Curlew was run only for year 1 as year 2 data, which was collected between October 2020-April 2021, only included a short period (March – April 2021) when Curlew were present and was too short a period to extrapolate to enable an accurate collision risk estimate for the full Curlew breeding season.

Predictable Collision Risk Model

The collision risk estimate for Whooper swan, Greylag goose and Pink-footed goose was modelled using the predictable collision risk model. This model is employed when bird flight activity is typically aligned in a given direction and occurs regularly, suggesting movements from a regular point, most typically a roost or a nest site. In these circumstances collision rates are modelled with reference to a collision corridor based around the axis of the flights and the number of turbines contained within that corridor as well as the number of flights observed in the time pe perpendicular to the prevailing direction of flight and the number of flights which cross the collision risk window in the time observed. Most of the flights made were in a northerly direction as can be seen in Technical Appendix Figures 7-1-7 to 7-1-11. A collision risk window of 395m length was used for modelling.

The following assumptions were made for the various species:

- A daylight calculator was used to produce figures for the total daylight period at the Proposed Development;

- Biometric data (bird length and wingspan) for the various species were obtained from the BTO webpage, (BTO, 2020)
- An assessment was made on the months active within the Survey Area for each species, with some species resident and others seasonal visitors. All species were considered active during the day only; and
- Flight speed data taken from (Alerstam, et al., 2007)

Turbine parameters used for modelling are reported in Table 7-3. The biometric parameters applied to the model used to estimate goose and swan collision mortality are set out in Table 7-5.

Table 7-5: Predictable CRM Biometric Parameters

Species	Greylag goose	Pink-footed goose	Whooper swan
Bird length (m)	0.82	0.68	1.52
Wingspan (m)	1.64	1.52	2.3
Bird speed (m/s)	17.1	17.1	17.3
Avoidance rate	0.998	0.998	0.995
Months active	October – April	September – March	October – March
Daylight hours	2044.69	1995.52	1610.95
Nocturnal hours	613.46	623.3	0
Total hours	2658.15	2618.81	1610.95
Assumed activity period	daylight hours and 20% of nocturnal hours	daylight hours and 20% of nocturnal hours	daylight hours only
Flapping / gliding	Flapping	Flapping	Flapping

7.5 Significance Criteria

The CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2022) (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 ecological 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 significance of effects of any residual impacts predicted.

The following definitions of the terms 'impact' and 'effect' are used in this chapter:

- impact – actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow.
- effect – outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow.

The initial action for any Ecological Impact Assessment (EcIA) is to determine which features should be subject to detailed assessment. The ecological receptors to be the subject of more detailed assessment should be of sufficient value that impacts upon them may result in effects which are significant in terms of either legislation or policy. The receptors should also be vulnerable to significant impacts arising from the development.

All designated nature conservation sites, plant and animal species, habitats and integrated plant and animal communities that occur within the 'Zone of Influence'

(hereafter referred to as the ZOI) of the Proposed Development are defined as potential ecological features (as described below). The ZOI for a project is defined here as the area over which ecological features may be affected by biophysical changes as a result of the Proposed Development and associated activities. The ZOI is likely to extend beyond the Proposed Development, for example where there are ecological or hydrological links beyond the Proposed Development Site boundary. The ZOI will also vary for different ecological features, depending on their sensitivity to environmental change.

7.5.1 Determining Value

The CIEEM guidelines recommend that the value of ecological features is determined based on a geographic frame of reference. For this project the following geographic frame of reference is used:

- International (nature conservation designation, habitat or populations of species of international importance, e.g. a 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 SSSI or a National Nature Reserve (NNR), a nationally important population / assemblage of a species listed on Schedule 1 of the WCA or Annex 1 of the Birds Directive);
- Regional (nature conservation designation, habitat or populations of species of importance at the level of NHZ 2, North Caithness and Orkney, e.g. a site/population that meets SSSI designation criteria but has not been designated due to better examples being present in the regional area or a regionally important population/area of a Scottish Biodiversity List (SBL) priority species or BoCC amber or red species);
- County (i.e. NHZ 2 mainland component), a population of birds which are important at the LBAP level and represent an important part of the NHZ population of that species.
- Local (i.e. within 5 km) (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).

7.5.2 Valuing Species

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 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;
- **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
- **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. The current LBAP for the Highland area (THC, 2021) highlights commitment to planning developments with consideration for biodiversity protection but does not provide specific information which requires additional assessment.

7.5.3 Predicting and Characterising Impacts and Effects

The CIEEM guidelines suggest that the process of predicting ecological impacts and effects should take account of relevant ecosystem structure and function such as:

- available resources – e.g. territory, food and water;
- environmental process – e.g. flooding, erosion, eutrophication, deposition and climate change;
- ecological processes and relationships – e.g. population dynamics, vegetation dynamics and predator/prey relationships;
- human influences – e.g. animal husbandry, burning, pollution, disturbance from public access; and
- historical context – e.g. natural range of variation, historical human influences and geomorphological evolution.

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

- confidence in predictions – the level of certainty that 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.

Both direct and indirect impacts are considered: direct ecological 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 ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or receptor, e.g. external sourcing of stone for road surfaces may cause growth of plant species not generally found in that area of the Proposed Development.

7.5.4 Significant Effects

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 may not have an effect on its national population.

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.

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.

7.5.5 Mitigation, Compensation and Enhancement

It is important as part of any Environmental Impact Assessment (EIA) 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.
- Enhancement is used to refer to measures that will result in positive ecological impacts but which do not relate to either specific significant negative impacts or where measures are required to ensure legal compliance.

7.5.6 Assessment Areas

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.

7.6 Baseline Conditions

The results of each ornithological survey are presented within the Ornithology Technical Appendix, Section 7-1-4. This section provides an assessment of the ornithological receptors found on and in the vicinity of the Proposed Development Site and assesses their value in the context of the Proposed Development.

7.6.1 Designated Sites

Special Protection Areas

There are three SPAs within 10km of the Proposed Development and no additional sites designated for geese on extending the search radius to 20km. The SPA sites identified are:

- Caithness Lochs SPA (NS, 2023);
- Caithness and Sutherland Peatlands SPA (NS, 2023); and
- North Caithness Cliffs SPA (NS, 2023).

More details on these sites are shown in Table 7-6. The closest components of these designated areas to the Proposed Development Site are provided and information is also provided on which SSSI underlies the SPA at that point, if it is within the SSSI search area.

Species names are **marked in bold** when within the core connectivity ranges specified by guidance (Scottish Natural Heritage, 2018).

Table 7-6: SPA receptors within 20 km of the Proposed Development

Designated Site	Distance of closest component from the Proposed Development Site	Species	Scientific Name	Criteria for inclusion	Population Estimate
Caithness Lochs SPA	2.5 km SW (Loch Scarmclate SSSI) 1.0 km N (Loch of Durran SSSI – not part of SPA but important for Whooper swans that form part of the designated population)	**Whooper swan**	*Cygnus cygnus*	Article 4.1	Winter peak mean of 240 (4% of GB population, 1% of Icelandic population) (1993/1994 – 1997/1998)
		Greylag goose	*Anser anser*	Article 4.2	Winter peak mean of 7,190 (7% of GB and Icelandic populations) (1993/1994 – 1997/1998)
		Greenland white-fronted goose	*Anser albifrons flavirostris*	Article 4.1	Winter peak mean of 440 (3% of GB population, 1% of Greenlandic population) (1993/1994 – 1997/1998)
Caithness and Sutherland Peatlands SPA	8.0 km East (Stroupster Peatland SSSI)	**Black-throated Diver**	*Gavia arctica*	Article 4.1	2001: 30 pairs (3% of GB population), 2007: 30 pairs
		Golden eagle	*Aquila chrysaetos*	Article 4.1	2001: 5 pairs (1.3% of GB population), 2007: 5 pairs
		Golden Plover	*Pluvialis apricaria*	Article 4.1	2001: 1064 pairs (4.7% of GB population), 2007: 1922 pairs
		Hen Harrier	*Circus cyaneus*	Article 4.1	2001: 14 pairs (2.8% of GB population), 2007: 18 pairs
		Merlin	*Falco columbarius*	Article 4.1	2001: 54 pairs (4.2% of GB population), 2007: 54 pairs
		Red-throated Diver	*Gavia stellata*	Article 4.1	2001: 89 pairs (9.5% of GB population), 2007: 46 pairs
		Short-eared Owl	*Asio flammeus*	Article 4.1	2001: 30 pairs (3% of GB population), 2007: 30 pairs
		Wood Sandpiper	*Tringa glareola*	Article 4.1	2001: 5 pairs (50% of GB population), 2007: 6 pairs
		Common Scoter	*Melanitta nigra*	Article 4.2	2001: 27 pairs (<0.1% of Western Siberian/ Western & Northern Europe/ Northwestern Africa population), 2007: 26 pairs

Designated Site	Distance of closest component from the Proposed Development Site	Species	Scientific Name	Criteria for inclusion	Population Estimate
		Dunlin	*Calidris alpina schinzii*	Article 4.2	2001: 1860 pairs (16.9% of the Baltic/UK/Ireland population), 2007: 1366 pairs
		Greenshank	*Tringa nebularia*	Article 4.2	2001: 54 pairs (0.4% of the Europe/Western Africa population), 2007: 653 pairs
		Wigeon	*Mareca penelope*	Article 4.2	2001: 43 pairs (<0.1% of Western Siberian/Northwestern/Northeastern Europe population), 2007: 43 pairs
North Caithness Cliffs SPA	5.8 km N (Dunnet Bay)	Peregrine	*Falco peregrinus*	Article 4.1	6 pairs (0.5% of GB population) (figure from SPA citation 2018)
		Guillemot	*Uria aalge*	Article 4.2	38,300 individuals (1% of the North Atlantic biogeographic population and 4% of GB population) (1985 – 1987)
		Fulmar	*Fulmarus glacialis*	Article 4.2	14,700 pairs (3% of GB population) (1985 – 1987)
		Kittiwake	*Rissa tridactyla*	Article 4.2	13,100 pairs (3% of GB population) (1985 – 1987)
		Razorbill	*Alca torda*	Article 4.2	4,000 individuals (3% of GB population) (1985 – 1987)
		Puffin	*Fratercula arctica*	Article 4.2	2,080 pairs (0.4% of GB population and greater than 2,000 individuals) (1985 – 1987)
		Seabird assemblage	No additional species beyond those listed above	Article 4.2	110,000 individuals (1985 – 1987)

Ramsar Sites

There are two Ramsar sites within 10km of the Proposed Development with no additional sites designated for geese on extending the search radius to 20km. These Ramar sites are the Caithness and Sutherland Peatlands (NS, Caithness and Sutherland Peatlands Ramsar, 2005) and Caithness Lochs (NS, Caithness Lochs Ramsar, 2005) and overlie SPAs with the same names.

Caithness Lochs Ramsar is designated for Greylag goose, although noteworthy bird species listed are Ruff *Philomachus pugnax*, Whooper swan and Greenland White-fronted goose.

Caithness and Sutherland Peatlands Ramsar is designated for its breeding population of Dunlin. Breeding Greylag goose is also mentioned as a reason for the designation, although no further information is given on the Ramsar Information Sheet. Noteworthy bird species include those for which the Caithness and Sutherland Peatlands SPA is designated as well as Teal *Anas crecca*, Curlew *Numenius Arquata* and Arctic skua *Stercorarius parasiticus*.

Sites of Special Scientific Interest

The following Sites of Special Scientific Interest, listed in Table 7-7 are also within 10km of the Proposed Development Site and have avian designations.

Of these sites one is designated for an assemblage of seabird bird species and one for an assemblage of breeding moorland birds and wildfowl and three are designated for wintering wildfowl species.

More detail on these sites is shown in Table 7-7. Bird species which, under this guidance, are within their core ranges, are marked in **bold** in the table below. Furthermore, none of the focal species mentioned in their Breeding Bird assemblage lists is especially prevalent on site.

Table 7-7: Sites of Special Scientific Interest with designations for geese or within 10 km with other avian designations or known to support an SPA population

Name	Distance and direction	Avian Interest	Reference
Loch of Durran SSSI	1.0 km N	**Whooper swan** is not part of designation but is part of the Caithness Lochs population (see section 1.3; NS, reported in THC Scoping document, 28 March 2022).	(NS, Loch of Durran SSSI, 2023)
Loch Scarmclate SSSI	2.5 km SW	**Greylag goose**, non-breeding population (Part of Caithness Lochs SPA)	(NS, Loch Scarmclate SSSI, 2023)
Loch Watten SSSI	4.1 km S	**Greylag goose**, non-breeding population (Part of Caithness Lochs SPA)	(NS, Loch Watten SSSI, 2023)
Loch Heilen SSSI	6.0 km NE	**Greylag goose**, Whooper swan, **Greenland White-fronted goose**, non-breeding populations (Part of Caithness Lochs SPA)	(NS, Loch Heilen SSSI, 2023)
Dunnet	7.8 km N	Designated specifically for Guillemot and	(NS, Dunnet Head SSSI,

Name	Distance and direction	Avian Interest	Reference
Head SSSI		Breeding Seabird Assemblage including Cormorant – *Phalacrocorax carbo*, Fulmar, Kittiwake, Puffin, Razorbill, Shag – *Phalacrocorax aristotelis*, Herring gull – *Larus argentatus*, Great black-backed gull – *Larus marinus* (Part of North Caithness Cliffs SPA)	2023)
Shielton Peatlands SSSI	9.9 km S	Breeding bird Assemblage including: Greylag goose, Arctic skua *Stercorarius parasiticus*, Golden plover, Hen harrier, Dunlin, Peregrine, Greenshank, Merlin, Red-throated Diver, Short-eared Owl, Wigeon. (Part of Caithness and Sutherland Peatlands SPA)	(NS, Shielton Peatlands SSSI, 2023)
Loch of Wester SSSI	10.6 km E	Non-breeding Whooper swan. (Also part of the Caithness Lochs SPA).	(NS, Loch of Wester SSSI, 2023)
Loch of Mey SSSI	11.3 km NE	Non-breeding Greenland white-fronted goose *Anser albifrons flaviroistris.* Breeding bird Assemblage including: Gadwall -*Mareca strepera*, Shoveler – *Spatula clypeata*, Little grebe -*Tachybaptus ruficollis*, Sedge warbler -*Acrocephalus schoenobaenus*, Reed bunting – *Emberiza schoeniculus*, Mute swan -*Cygnus olor*, Redshank – *Tringa ithout*, Snipe, Curlew and Lapwing. (Also part of the Caithness Lochs SPA).	(NS, Loch of Mey SSSI, 2023)
Loch Calder SSSI	11.9 km W	Non-breeding Greenland white-fronted goose, **Greylag goose** and Whooper swan. (Also part of the Caithness Lochs SPA).	(NS, Loch Calder SSSI, 2023)
Broubster Leans SSSI	15.8 km W	Breeding bird assemblage including: Wood sandpiper, Spotted crake – *Porzana porzana*, Hen harrier, Short-eared owl, Wigeon, Snipe, Teal – Anas crecca, Greenshank, Dunlin. (Also part of the Caithness Lochs SPA).	(NS, Broubster Leans SSSI, 2023)
Lambsdale Leans SSSI	16.7 km SW	Breeding bird assemblage including: Grey heron- *Ardea cinerea*, Greylag goose, Teal, Wigeon, Tufted duck – *Aythya fuligula*, Dunlin, Snipe, Curlew, Redshank, Greenshank and Common sandpiper *Actitis hypoleucos*..	(NS, Lambsdale Leans SSSI, 2023)

National Nature Reserves

Forsinard Flows National Nature Reserve predominantly overlaps with the Caithness and Sutherland Peatlands (discussed above) and much of this land is under RSPB ownership. The closest part of this geographically disjunct landholding is 13.5km to the southwest of the Proposed Development.

Candidate World Heritage Site

The nomination for the Flow Country candidate World Heritage Site (cWHS) was submitted in February 2023. The basis of the application for WHS status is down to the Flow Country being considered the most outstanding example of a blanket bog ecosystem in the world. If accepted it would become the first WHS to be designated in Scotland for ecological/natural features.

WHS's are designated because of the recognition of their Outstanding Universal Value (OUV).

The cWHS is nominated under two of the criteria for which WHS can be nominated:

- (ix) to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;
- (x) to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

Table 7-8 provides the features/attributes, which provide more detail about the criteria for OUV, for the cWHS.

Table 7-8: List and description of candidate World Heritage Site Attributes related to ornithology receptors

(Flow Country Candidate World Heritage Site Steering Group, 2022

Attribute	Description
Criterion (x) contains the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	
a) species associations	The diverse range of habitats that The Flow Country contains supports an exceptional and specialised blanket bog biodiversity and holds biological associations unlike any other blanket bog found globally. This is a consequence of the overlapping distributions of species typical of both arctic and temperate climatic zones and is further influenced by altitudinal and climatic gradients and the geological diversity found across the site. Furthermore, the scale and connectivity of the site provides resilience to species it contains.
A.i) birds	The diversity of environments within the blanket bog of The Flow Country, and the patchwork of connected landscape elements within the wider setting (farmland, coastal, etc.), supports a distinctively special assemblage of birds. The precise combination of species, with arctic-alpine and temperate and continental elements is not found anywhere else in the world and includes; red-throated diver, black-throated diver, common scoter, Eurasian wigeon, golden plover, Eurasian greenshank, dunlin, wood sandpiper, golden eagle, merlin, hen harrier and short-eared owl.

Non-Statutory Sites

The RSPB owns land at three locations within 20km of the Proposed Development; Forsinard Flows (14km south southwest), Broubster Leans (15km west) and Dunnet Head (14km north). These lands have varying degrees of overlap with underlying designated sites with the same names and with portions of un-designated land.

7.6.2 Species

The account of the baseline species begins with three gregarious species which feed in agricultural land during the day and roost on bodies of water at night. Whooper swan and Greylag goose, which are qualifying features of the Caithness Lochs SPA and a non-qualifying species (Pink-footed goose). These species have similarities in their behaviour, with predictable flight behaviour and a potential for barrier effects (i.e. the fact that turbines might create a barrier which they will not fly through) which do not apply so much to species with less regular flights.

Goose and Swan Ecology

The choices of roosting and feeding areas of goose and swan species influence the likely variability in their flight habits and risk from future barrier and collision effects. These species feed in a widespread habitat, primarily of improved grassland and stubble (Forrester, et al., 2007). Field use is influenced by crop type, rotational cropping, typically at the scale of farm holdings, disturbance events at smaller scale and depletion of feeding resources.

Roost sites, typically on undisturbed open water, are more patchily distributed and populations vary in their use of roost sites in response to disturbance or changing foraging quality in an area. Feeding locations around roosts are typically restricted by the energetic costs of flight to within 20km and five km for swans (NS, 2018). Roost sites are well-defined, regularly inhabited places, holding large aggregations of birds, and so in many locales, regular counts are carried out via the Wetland Bird Survey (WeBS) to support long term population monitoring on local or wider scales. Variability in this data can suggest possible trends in the risk exposure of assessed populations over a longer time period than for more granular data gathered by surveys to inform the EIAR.

Furthermore, there are studies by Patterson, for both Pink-footed and Greylag geese, (Patterson, et al., 2013), and by Mitchell (Mitchell, 2012) for Greylag goose which detail feeding and roosting locations in the areas around the Proposed Development whilst Patterson also considers the flight direction of birds leaving roost sites. These sources can inform the understanding of likely variation in barrier effects, collision risks, disturbance and displacement.

In the following accounts of designated features and qualifying sites information will be considered as follows:

- Roosts use, from WeBS counts (Austin, et al., 2023);
- Feeding areas, from surveys for the Proposed Development and, where applicable, from Mitchell (Mitchell, 2012) or Patterson (Patterson, et al., 2013); and
- Flight behaviour and ground observations from vantage point observations and goose foraging surveys.

Greylag Goose

Breeding Greylag goose in Caithness are generally considered to be from wild rather than feral populations (Forrester *et al.*, 2007) and are amongst those which are listed on Schedule 1 of the WCA. Greylag goose are amber-listed on BoCC and are considered to be at risk from wind farms (SNH 2018a). Although not described as a reason for designation on the Ramsar Information Sheet, they are listed as a feature of the Ramsar by NS.

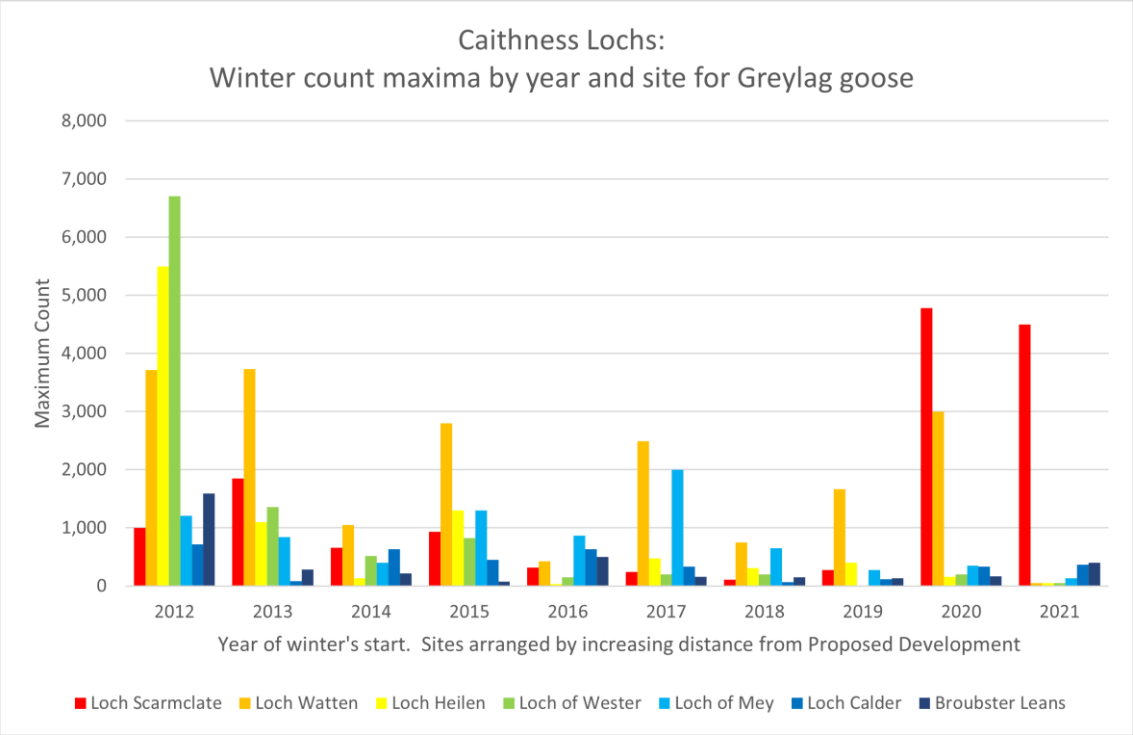
In addition to the non-breeding populations of Greylag goose at the Caithness Lochs SPA, Greylag goose is a qualifying feature of the following sites falling within the core connectivity range specified under guidance (NS, 2018), of 20 km: Loch Scarmclate SSSI: 2.3 km, Loch Watten SSSI: 4.1 km, Loch Heilen SSSI: 5.9 km and Loch Calder SSSSI 11.9km. There is also a breeding population at Shielton Peatlands SSSI: 9.9 km away.

There are no estimates available for the breeding population of Greylag goose within NHZ 2. Breeding Bird Surveys in 2023 found no evidence of breeding was recorded and only a single bird during Breeding Bird Surveys was seen. Flight activity on the Proposed Development Site was low during the breeding season (see Technical Appendix 7.1 Sections 4.1.3 to 4.1.5), with no evidence of presence between June and August and with April and May records in 2023 likely to be late migrants. For this reason, the importance of the Proposed Development for breeding populations of this species is considered to be Less than Local.

Further discussion will focus on the non-breeding population, the mainland component of NHZ 2 defining the county level of significance and the entirety of NHZ 2 defining regional significance. In lieu of any direct estimates of NHZ populations, County level population will be estimated with reference to that of the Caithness Loch SPA. This is because all roost sites with conservation designations within NHZ 2 are within the Caithness Lochs SPA and nearly all of the sites within the Caithness Lochs SPA are within NHZ 2. Broubster Leans and Loch Calder are outside of the NHZ but WeBS data indicates that over the last 10 recorded winters they represent only about 11% of the SPA population. Mitchell gives an estimate of 8,826 Icelandic Greylag geese within the Caithness Lochs SPA and an Orkney population in the order of 60,000 Icelandic Greylag geese and 10,000 British Greylag (Mitchell, 2012). The total regional population for the NHZ is therefore in the order of 70,000 or 80,000 birds. Using WeBS maximum count data for the last five years available (2017/18 – 2021/22) for the SPA gives an estimated population of County level of 5,111 birds.

Reference to maximum count information from the WeBS and Goose and Swan Monitoring Programme (Austin, et al., 2023) for the last ten winters shows the distribution of Greylag goose within the roosting sites of the Caithness Lochs SPA. This is shown in Chart 7-1.

Chart 7-1 WeBS Winter count maxima for Greylag goose at Caithess Lochs SPA sites



Loch Heilen and Loch Wester, which lie to the north and to the east of the Proposed Development respectively, held the greatest numbers of Greylag geese early in the period. WeBS data for the period covered by surveys for the Proposed Development (starting 2019 and 2020) showed that Loch Watten and Loch Scarmclate, which are closest to the Proposed Development, held the largest numbers of birds. It seems that over the 10 year period the locus of the population has moved towards the Proposed Development with decreasing use of Lochs Wester and Heilen.

Historical reports of field use Patterson, (Patterson, *et al*., 2013) and Mitchell (Mitchell, 2012), showed patterns of use with concentrations in the Loch Durran area, to the north of and overlapping with the Proposed Development, and in the Loch Scarmclate area to the south of the Proposed Development. Technical Appendix Figure 7-1-20 shows the mean number of birds using fields per visit. The mean number of birds per survey was 130 birds, and these were typically concentrated to the north and the south of the Proposed Development, with birds recorded in the Durran area and between Loch Scarmclate and the Proposed Development. However, in only three fields were birds observed feeding on more than one occasion; fields 146 adjacent to Loch Scarmclated, and fields 352 and 353, next to Loch Durran.

Patterson (Patterson, et al., 2013) looked at the flight behaviour of birds leaving roosts summarising their flight directions with an eight-point compass bearing. Out-bound flights from the Loch Heilen roost towards the feeding areas to the north of the Proposed Development, which, if to more frequented fields close to the Loch of Durran, would not cross the turbine envelope. Flights leaving roosts from Loch Scarmclate were marked heading southeast towards Loch Watten, northwest towards Thurso and east towards Wick. Although the recorded flight lines were short, they suggest that these flights would predominantly have avoided the turbine envelope. Flight data from the current surveys (Technical Appendix Figure 7-1-7) indicate, some northeasterly/southwesterly movements to and from the direction of Loch Swarclate

that were likely to cross the turbine envelope. It is likely that this change in flight behaviour is related to greater use of fields between the Scarmclate and Loch Durran clusters during the survey period.

Table 7-9 shows Greylag goose flights recorded during the VP surveys. This activity is shown in Technical Appendix Figures 7-1-7, 7-1-8 and 7-1-11.

Table 7-9: Greylag Goose Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
September 2019 – February 2020	1	500	40	542850	418125
March – August 2020	16	16	1	400	400
September 2020 – February 2021	1	150	40	90786	81242
March – May 2021	1	100	4	10665	10665
March – August 2023	2	250	8	53795	33445
Total	1	500	93	698496	543877

Despite there being the same number of flights, there was a marked difference between the bird seconds recorded in the winter of 2019 to 2020 and that for winter 2020 to 2021 with larger flock sizes and more bird seconds recorded in the former period. Flight lines recorded during these surveys, shown in Technical Appendix Figures 7-1-7, 7-1-8, are typically concentrated to the south and west of the turbine envelope with birds with very changeable flight directions which is consistent with birds looking for locations to feed. There was also evidence from vantage point locations of birds taking off from or landing in fields to the south of the Proposed Development. Flight paths closer to the Proposed Development were more direct suggesting birds that were heading to more distant locations. Flight activity between March and August 2023, shown in Technical Appendix Figure 7-1-11, was less, which is to be expected given that, based upon the patterns of occurrence and behaviour, the majority of the Greylag goose recorded were migratory birds and activity was predominantly to the south of the Proposed Development.

Referring to WeBS count information referenced earlier in this section where there was an apparent increase between 2019 and 2020 in counts at Loch Scarmclate, there does not appear to have been a parallel increase in recorded flight activity, which fell substantially over this period, suggesting birds may be departing the roost in directions other than over the Proposed Development.

In view of the non-breeding population of Greylag goose in the vicinity of footprint of the Proposed Development, with an average of around 130 birds within the survey area, with flights across the survey area totalling up to 500 birds and the frequency with which those flights occurred, the Proposed Development is considered be of County level value for this internationally important population. There was no foraging use of the Proposed Development which would have warranted a higher evaluation.

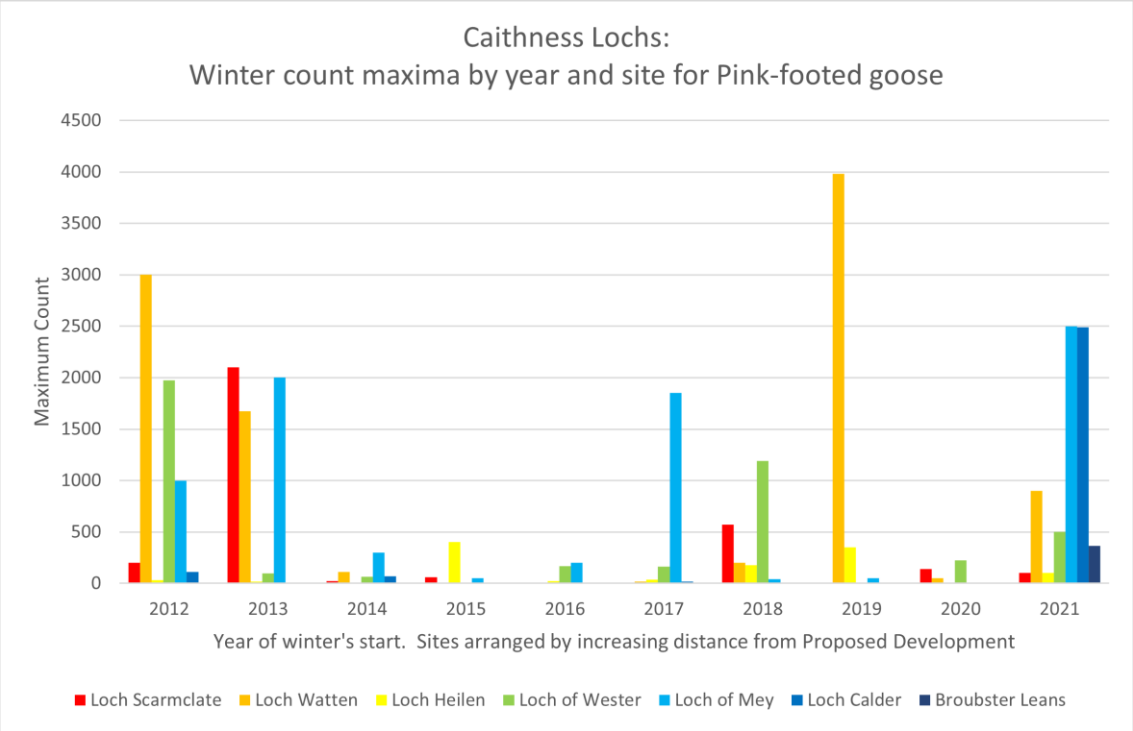
Pink-footed goose

Pink-footed goose is amber-listed on BoCC. The species is considered to be at risk from wind farms (Scottish Natural Heritage, 2018). It is not a qualifying species for any SPA in the vicinity of the Proposed Development.

The Regional population defined by the NHZ 2 peak count of wintering Pink-footed goose is estimated at 20,746 birds (Wilson, 2015). A County population estimate, here defined as the mainland component of NHZ 2, is harder to because there the Caithness Lochs SPA, which was used as a proxy for Greylag goose, does not apply to Pink-footed goose.

Maximum count information from the WeBS and the Goose and Swan Monitoring Programme (Austin, et al., 2023) for the last ten winters is shown in Chart 7-2.

Chart 7-2 WeBS Winter count maxima for Pink-footed goose at Caithess Lochs SPA sites



This data appears to indicate that over the entire period Lochs Mey and Watten have often been important but with very substantial variation in numbers. The winter of 2019/20, a winter in which surveys were conducted for the Proposed Development, had the highest count at any single location with nearly 4000 birds at Loch Watten. However this level of usage is sporadic rather than frequent.

A report commissioned in 2013 for NS, (Patterson, *et al.*, 2013), detailed the use of the Caithness Lochs SPA area by Pink-footed goose. Important feeding areas for Pink-footed goose were reported just to the west and overlapping with the Proposed Development, a little further north in the vicinity of the Loch of Durran and further south close to Loch Scarmclate. Compared to these findings data on Pink-footed goose field use (Technical Appendix Figure 1-7-19) showed some similarity with concentrations within 1km of the Proposed Development, of Loch Durran (not one of the SPA lochs) and of Loch Scarmclate. Surveys for the Proposed Development indicated a preferred location in field 17 within 1km to the east of the Proposed Development accounting for around 46% of the total count; fields in the vicinity of Loch Durran were also preferred. The total mean count for the entire survey area comes to just under 151 birds per survey. The mean count per survey for fields overlapping the ZOI is just over 112 birds.

Patterson (Patterson, et al., 2013) also looked at the flight behaviour of birds leaving roosts (but not returning to them). This indicated some southwesterly flights from the

Loch Heilen roost towards the feeding areas close to the Proposed Development, and some northeasterly flights from Loch Scarmclate which could cross the turbine envelope. Others, in an easterly direction were unlikely to intercept the Proposed Development Site. Flights leaving Loch Watten were recorded travelling in a southeasterly direction away from the Proposed Development.

Table 7-10 shows the flight activity of Pink-footed goose recorded during the VP surveys. Flight activity is shown in Figures 7-1-9 to 11.

Table 7-10: Pink-footed Goose Fight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
September 2019 – February 2020	5	600	17	259740	244640
March – August 2020	1	700	20	100336	100336
September 2020 – February 2021	1	18	5	1709	1709
March – May 2021	1	2	2	168	168
March – August 2023	1	120	36	111533	111533
Total	1	700	80	473486	458386

Survey flight data (Technical Appendix Figure 7-1-9 to 11) indicates that flight activity close to the Proposed Development was predominantly in a north/south axis, predominantly just to the west of the turbine placement with movements typically closer to the turbines in September 2019-August 2020 than in subsequent periods.

There were some observations of birds taking off or landing in fields within 500m south of the Proposed Development during September 2019 to August 2020. In March-August 2023 (Technical Appendix Figure 7-1-11), flight activity was observed further north and closer to the Proposed Development but mostly concentrated 700m or so to the west of the turbine locations and with some landings and takes offs in that area. Flight data in the period of September 2020 to May 2021 (Technical Appendix Figure 7-1-10) shows fewer and more direct flights without take offs and landings and in a predominantly northeast/southwest axis. The variation in flight activity may be linked to different field and roost use in these periods.

As discussed above in reference to WeBS count the 2019/20 winter had a substantial peak count that year at Loch Watten and it is likely that such a concentration of birds in the area will have contributed to the higher flight activity for that period. Flight activity in breeding seasons (March-August) was confined to March, during the migration period.

Pink-footed goose did not use fields within the development boundary. The birds in this area do not form part of an internationally important population, and while there were relatively large numbers of birds flying over the Proposed Development Site and feeding in the surrounding area, the limited interactions with the Proposed Development Site itself means that the conservation evaluation of the Proposed Development Site is assessed as Locally important to this population.

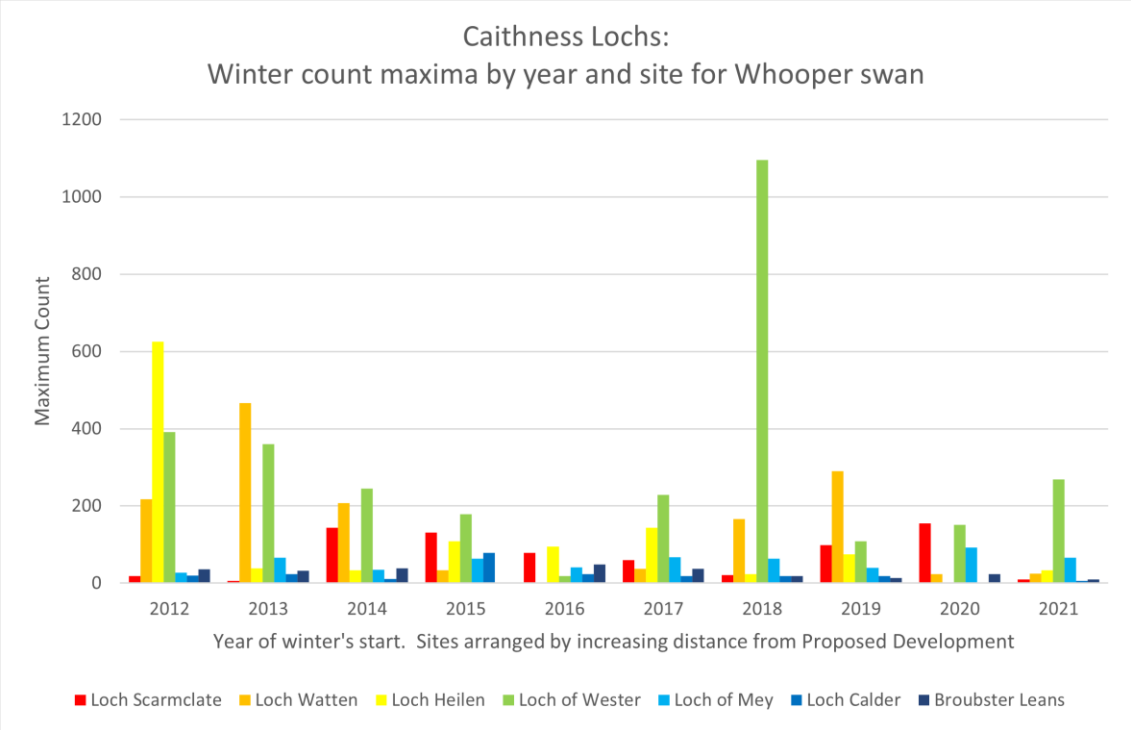
Whooper Swan

Whooper swan is listed on Annex I species of the Birds Directive and Schedule 1 of the WCA. The species is amber-listed on BoCC and is considered to be at risk from wind farms (SNH 2018a).

Whooper swan is a qualifying species of the Caithness Lochs SPA and Ramsar site with two underlying designated areas lying within the 5km core range specified by guidance (NS, 2018); Loch Scarmclate at 2.3km from the Proposed Development and Loch Watten SSSI at 4km from the Proposed Development. Neither of these sites is designated at SSSI level for the species. The NHZ 2 peak count of wintering Whooper swan, the area which is taken to define regional significance, is estimated at 706 birds (Wilson, 2015). Using the Caithness Lochs SPA population estimated using a five year mean for the period 2017/18 – 2021/22 as a proxy for the county level assessment, this gives a current population estimate of 702,

Reference to maximum count information from WeBS and Goose and Swan Monitoring Programme (Austin, et al., 2023) for the last ten winters provides information on the recent distribution of Whooper swan within counted sites within the Caithness Lochs SPA. This is shown in Chart 7-3. Note that there is no count area for Loch of Durran, which, although not designated for the species is known to be of importance for them.

Chart 7-3 WeBS Winter count maxima for Pink-footed goose at Caithess Lochs SPA sites



It appears that use of the roost sites within connectivity range of the Proposed Development, (NS, 2018), namely Loch Scarmclate and Loch Watten, during the period of assessment appears to be fairly representative of the entire ten year period.

Survey data on Whooper swan field use (Technical Appendix Figure 1-7-21) indicated the greatest activity in fields to the south of the Proposed Development. These had a maximum average of between four and five birds per survey in field 87 around 2km from the closest turbine and about 1km from the Proposed Development and not observed within 1km of areas flagged as feeding areas by Patterson. These fields lie between the Proposed Development and are appreciably closer to Loch Scarmclate, at around 2km than Loch Heilen at around 9km. In view of the connectivity distance given by NS, of 5km, (NatureScot, 2016) these birds are most likely to use Loch Scarmclate as a roost and flight paths from this area would not cross the Proposed

Development. Patterson (Patterson, et al., 2013), indicated some preferred foraging locations for Whooper swan to the north and west of the Proposed Development in the vicinity of Loch Durran and at Bishop's Hill. These areas, surveyed from October 2020 onwards, are both around 1.5km from the nearest turbine, and showed infrequent use in low numbers at the former locale, at field 353. The Loch Heilen roost is slightly further from the Loch Durran area, around 6km than Loch Scarmclate, just over 5km slightly beyond the connectivity range specified by NS, (NatureScot, 2016). Whooper swans accessing this area from Loch Heilen would not cross the turbine area although birds from Loch Scarmclate may do so. The Bishop's Hill area showed no evidence of use during surveys for the Proposed Development. If use was to occur, flight paths to this locale and to the areas most frequented during surveys for the Proposed Development could be unlikely to cross the turbine envelope.

Field use surveys for the Proposed Development indicate the total mean count for the entire survey area comes to just under 16 birds per survey. The survey area is larger than the likely ZOI for the Proposed Development which, in the context of displacement from turbines and disturbance from construction, for this species, discussed in more detail in sections 7.9 and 7.10, is more likely of the order of 600m. The mean count per survey for fields overlapping the ZOI is just over 2.3 birds.

Table 7-11 shows the flight activity of Whooper swan recorded during the VP surveys. Flight activity is shown in Technical Appendix Figure 7-1-9 and 7-1-10.

Table 7-11: Whooper Swan Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
September 2019 – February 2020	1	150	15	18865	18240
September 2020 – February 2021	1	14	9	3006	881
Total	1	150	24	21871	19121

Across the entire survey period most of the recorded flight activity (Technical Appendix Figure 7-1-9 to 7-1-10) was to the south of the Proposed Development with no flight activity recorded above collision risk height suggesting birds feeding or roosting locally. In the first winter period many of the flight lines had quite changeable flight directions which is consistent with birds looking for locations to feed. Whooper swans were recorded taking off from or landing in fields to the south of the development, all of them at distances of 800m or more from the nearest turbine.

Flight activity further north and close to the Proposed Development was more direct suggesting that birds were heading to more distant locations. Survey flight data, indicate movements predominantly on a north-south axis some of which were observed passing through the collision risk window.

Patterson (Patterson, et al., 2013) looked at the flight behaviour of birds leaving roosts using an eight-point compass system which identified out-bound flights from local roost sites. Various flight paths from the closest roost sites to the Proposed Development were noted but the ones with the most potential to supply birds to the vicinity are those heading north from Loch Scarmclate and South West from Loch Heilen. Neither of these flight paths are indicative of trajectories likely to pass over the Proposed Development.

While no Whooper swan were recorded using the Proposed Development Site, in view of the relatively high recorded flight activity, internationally important but relatively

small population, and foraging in the vicinity of the Proposed Development, it is considered to be of Regional importance for this species.

Common Scoter

Common scoter, is on Schedule 1 of the WCA, the SBL and is amber-listed on BoCC.

Common scoter is a qualifying feature of the Caithness and Sutherland Peatlands SPA & Ramsar, at closest 7.9km from the Proposed Development.

Common scoter was only observed once during surveys for the Proposed Development with a single flight recorded during a vantage point survey on the 8th January 2020. Being a record outside of the breeding season this individual does not form part of the Caithness and Sutherland Peatlands SPA population.

Table 7-12 shows the flight activity of Common scoter recorded during the VP surveys. Flight activity is shown in Technical Appendix Figure 7-1-16.

Table 7-12: Common Scoter Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
September 2019 – February 2020	1	1	1	35	35

Despite the conservation importance of this species, in view of its limited occurrence on the Proposed Development, the lack of suitable habitat and its occurrence outside of the breeding season it is considered to be of Less than Local Importance for this species.

Lapwing

Lapwing is red-listed on BoCC and is on the SBL.

Table 7-13 shows the flight activity of Lapwing recorded during the VP surveys. Flight activity is shown in Technical Appendix Figure 7-1-12 to 14.

Table 7-13: Lapwing Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
March – August 2020	1	4	36	1335	523
September 2020 – February 2021	6	70	7	20404	19997
March – May 2021	1	12	12	1425	1002
March – August 2023	1	150	18	117293	104755
Total	1	150	73	140457	126277

Four flights on 30th August 2023 contribute more than 100,000 flock seconds, which corresponds to greater than 90% of all Lapwing at risk seconds across the three years. This result was with respect to three different flocks of lapwings of 150, 130 and 25 birds. Post breeding dispersal occurs in late July – August and the flocks present at this time are likely to be birds moving from breeding areas to wintering areas.

Breeding Bird Surveys in 2020 indicate three confirmed and one possible breeding pairs. The confirmed breeding pairs were all to the southwest of the Proposed Development

at ranges of between 1 and 1.4km from turbine 2. Breeding Bird Surveys in 2023 found no evidence of breeding.

Despite the occasional presence of larger flocks of Lapwing, due to the limited occurrence of these flocks, and with only a relatively small breeding population present, the Proposed Development Site is assessed as being of Local significance for Lapwing.

Golden Plover

Golden plover, is listed on Annex I of the Birds Directive and the SBL. The species is considered to be at risk from wind farms (Scottish Natural Heritage, 2018)

The population estimate for Golden plover within NHZ 2 is 1,474 breeding pairs and the species is a qualifying feature of the Caithness and Sutherland Peatlands SPA & Ramsar: 7.9 km away and Shielton Peatlands SSSI: 9.9 km away.

Table 7-14 shows the flight activity of Golden plover recorded during the VP surveys. Flight activity is shown in Technical Appendix Figure 7-1-15.

Table 7-14: Golden Plover Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
March – August 2020	17	17	1	170	0

Only one flight, of 17 birds, on 21st April 2020, was recorded during VP surveys. Given the timing and number present these are not thought to be locally Breeding Birds and as such they would not be considered to form part of the population of the Caithness and Sutherland Peatlands SPA or of the Shielton Peatlands SSSI.

Golden plover were not recorded during Breeding Bird Surveys and there was no evidence for them breeding on or close to the Proposed Development.

In view of the paucity of records in the survey area the Proposed Development is considered to have Less than Local importance for this species.

Curlew

Curlew is on the SBL, considered at risk from windfarms (Scottish Natural Heritage, 2018) and red-listed on BoCC.

The population estimate for Curlew within NHZ 2 is 3,233 breeding pairs.

Table 7-15 shows the flight activity of Curlew recorded during the VP surveys. Flight activity is shown in Technical Appendix Figure 7-1-12 to 7-1-15. Most activity occurred during the breeding season.

Table 7-15: Curlew Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
March – August 2020	1	1	21	524	174
March – May 2021	1	1	1	20	20
March – August 2023	1	2	61	1768	1046
Total	1	2	83	2312	1240

In 2020 there were two probable and one possible territories in the survey area, in 2023 there was a single probable territory.

The Proposed Development is considered to be of Local significance for this species due to the limited breeding activity and absence outside the breeding season.

Whimbrel

Whimbrel, *Numenius phaeopus*, is on Schedule 1 of WCA, red-listed on BOCC and considered to be at risk from windfarms (Scottish Natural Heritage, 2018).

The population estimate for Whimbrel within NHZ 2 is three breeding pairs.

Table 7-16 shows the flight activity of Whimbrel recorded during the VP surveys. Flight activity is shown in Technical Appendix Figure 7-1-16.

Table 7-16: Whimbrel Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
March – May 2021	1	1	1	20	20

Only one flight, of a single bird in May 2021, was recorded during vantage point surveys

This species was not recorded during Breeding Bird Surveys and there was no evidence of breeding. Whimbrel are a rare breeding species on the Scottish mainland with most Breeding Birds being recorded on Shetland (Forrester, et al., 2007); this bird is more likely to have been a migrant which are more commonly recorded in Scotland.

In view of the paucity of records in the survey area the Proposed Development is considered to have Less than Local importance for this species.

Snipe

Snipe is amber listed on BOCC and considered to be at risk from windfarms (Scottish Natural Heritage, 2018).

The species was recorded during vantage point surveys but all records are of birds outside of what became the Breeding Bird Survey area for the Proposed Development and within more suitable (wetter) habitat.

Table 7-17 shows the flight activity of Snipe recorded during the VP surveys. Flight activity is shown in Technical Appendix Figure 7-1-15.

Table 7-17: Snipe Flight Activity

Row Labels	Min of Count	Max of Count	Count of Unique identifier	Sum of Flock seconds	Sum of At risk flock seconds
March – August 2020	1	3	4	273	273
March – May 2021	1	5	7	129	45
Total	1	5	11	402	318

This species was recorded as territorial during Breeding Bird Surveys in 2021 but all were outside of the subsequent Breeding Bird Survey area for the Proposed Development.

In view of the fact that this species was not seen within the survey area for the Proposed Development it is considered that the Proposed Development is of Less than Local importance for this species.

Redshank

Redshank, is amber listed on BOCC.

The species was not recorded in flight during vantage point surveys but a single bird was recorded as a heard only record in April 2020.

A single bird was seen in flight during Breeding Bird Surveys in May 2020. There was no evidence to suggest it was breeding.

In view of the paucity of records in the survey area the Proposed Development is considered to have Less than Local importance for this species.

Herring Gull

Herring gull was recorded as a secondary species but is considered here for its significance as part of the Breeding Bird assemblage of Dunnet Head SSSI, 7.8km from the Proposed Development.

Table 7-18 shows the flight activity of Herring gull recorded during the VP surveys.

Table 7-18: Herring gull flight activity

Row Labels	Min of Number of Birds	Max of Number of Birds	Count of Unique identifier	Sum of Flock seconds	Sum of Flock seconds at Risk height
September 2019 – February 2020	3	150	12	82005	77105
March – August 2020	5	45	5	3348	2900
September 2020 – February 2021	1	200	28	68979	62677
March – May 2021	1	4	6	725	535
March – August 2023	1	50	6	8205	7435
Total	1	200	57	163262	150652

Table 7-19 shows the flight activity of Herring gull by month recorded during the VP surveys.

Table 7-19: Herring Gull Flight Activity by Month

Month	Minimum No. of Birds	Maximum No. of Birds	Number of flights	Total Bird seconds	At risk Bird Seconds
January	1	60	10	9948	7189
February	1	58	20	40631	35188

Month	Minimum No. of Birds	Maximum No. of Birds	Number of flights	Total Bird seconds	At risk Bird Seconds
March	2	50	6	10851	10585
April	1	1	2	65	65
May	1	4	5	334	210
Jun	0	0	0	0	0
July	6	7	2	248	0
August	1	14	2	780	10
September	0	0	0	0	0
October	0	0	0	0	0
November	3	200	6	29180	26180
December	3	150	4	71225	71225
Total	1	200	57	163262	150652

Activity was relatively low during the breeding season, i.e. between April and August when Herring gulls nest (Ferguson-Lees, et al., 2002) and hence the majority of activity on the Proposed Development Site is not attributable to the SSSI population at Dunnet Head. Activity was much greater during the non-breeding season.

In view of the general abundance of this species and seasonality of occurrence suggesting it is unlikely that these birds are Breeding Birds associated with the SSSI the Proposed Development is considered to have Less than Local significance for this species.

Arctic Skua

Arctic skua, is red -listed on the BOCC, is on the SBL and considered to be at risk from windfarms (Scottish Natural Heritage, 2018).

The population estimate for Arctic skua within NHZ 2 is 399 breeding pairs.

The species is part of the Breeding Bird assemblage of Shielton Peatlands SSSI, which is 9.9km northeast of the Proposed Development.

Table 7-20 shows the flight activity of Arctic skua recorded during the VP surveys. Flight activity is shown in Technical Appendix Figures 7-1-16.

Table 7-20: Arctic Skua Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
March – August 2023	1	1	1	120	120

The single record of this species is from the 1st March 2023, outside the breeding season for this species and not attributable to any local designated population.

In view of the paucity of records in the survey area the Proposed Development is considered to have Less than Local significance for this species.

Cormorant

Cormorant forms part of the Breeding Bird assemblage of Dunnet Head SSSI, 7.8km away.

Table 7-21 shows the flight activity of Cormorant recorded during the VP surveys. Flight activity is shown in Technical Appendix Figure 7-1-16. Cormorant was not recorded during Breeding Bird Surveys.

Table 7-21: Cormorant Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
September 2019 – February 2020	1	1	1	5	5

Cormorants can commute long distances so potentially this record could relate to a bird from the Dunnet Head population. However, it was a single record which occurred outwith the breeding season and there was no other records of this species from any other survey. As a result, the Proposed Development is considered to have Less than Local significance for this species.

Osprey

Osprey, *Pandion haliaetus*, is on Annex I of the Birds Directive, Schedule 1 of the WCA, the amber list of BOCC and the SBL. The species is considered to be at risk from windfarms (Scottish Natural Heritage, 2018).

The population estimate for Osprey within NHZ 2 is one breeding pair (Wilson, et al., 2015).

This species was not observed from vantage point surveys or Breeding Bird Surveys. Raptor surveys in 2020 identified a nesting location at a range of 3km from the Proposed Development and birds were seen hunting in this area in 2023 outside of the revised survey area. Further details are provided in Confidential Technical Appendix 7-2.

In view of the rarity of the species within the NHZ, but considering there was no activity over the Proposed Development and the lack of suitable habitat on the Proposed Development Site, the Proposed Development is considered to have Local importance for this species.

Hen Harrier

Hen harrier is on Schedule 1 of the WCA, the red list of BOCC and the SBL. The species is considered to be at risk from windfarms (Scottish Natural Heritage, 2018).

Hen harrier is a qualifying feature of Caithness and Sutherland Peatlands SPA & Ramsar: 8km away and part of the Breeding Bird assemblage of Shielton Peatlands SSSI 9.9km away.

The population estimate for Hen harrier within NHZ 2 is 105 breeding pairs.

Table 7-22 shows the flight activity of Hen harrier recorded during the VP surveys. Flight activity is shown in Technical Appendix Figure 7-1-16.

Table 7-22: Hen Harrier Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
September 2019 – February 2020	1	1	1	320	0
March – August 2020	1	1	1	80	0

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
September 2020 – February 2021	1	1	2	58	36
Total	1	1	4	458	36

Of the four flights recorded only one was at a time that could signify that the bird observed was breeding, with 80 seconds of flight below risk height from an adult female on the 1st July 2020, within the breeding season of this species (Hardey, et al., 2013). However, birds which have failed breeding will depart their territories early and presumably rove widely during post breeding or failed breeding dispersal. The remaining three flights were in February and October.

Hen harrier was not seen during Breeding Bird or Breeding Raptor surveys.

Hen harrier is relatively infrequent in the area and so it is considered that the Proposed Development has Less than Local importance for this species.

Barn Owl

Barn owl, *Tyto alba*, is listed on Schedule 1 and the SBL.

This species is not known from Orkney and so population estimates for Local and Regional level will be similar. Data from the Scottish Raptor Study Group annual report (Challis, et al., 2022) show six occupied territories in Caithness in 2020, and 40 across the Highland area. This may underestimate the population but it is likely to be a very low density species in this locale.

Barn owl was confirmed present with a single pair being confirmed as breeding during Breeding Raptor Surveys in 2020.

Table 7-23 shows the flight activity of Barn owl recorded during the VP surveys. Flight activity is shown in Technical Appendix Figures 7-1-16. There were no recorded flight seconds at risk height and only 2 flights recorded from vantage points amounting to 17 seconds of flight in October and November 2011.

Table 7-23: Barn Owl Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
September 2020 – February 2021	0	1	1	2	17

With a single breeding record in the survey area, it is considered that the Proposed Development is of Regional importance for this species due to the small population size present in the north of Scotland.

Peregrine

Peregrine is listed on Schedule 1, Annex 1 and the SBL. The species is considered to be at risk from windfarms (Scottish Natural Heritage, 2018).

Peregrine is a qualifying feature for the North Caithness Cliffs SPA.

The population estimate for Peregrine within NHZ 2 is 22 breeding pairs, (Wilson, et al., 2015).

Table 7-24 shows the flight activity of Peregrine recorded during the VP surveys. Flight activity is shown in Technical Appendix Figures 7-1-16.

Table 7-24: Peregrine Flight Activity

Period	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
September 2019 – February 2020	1	1	1	20	15
September 2020 – February 2021	1	1	1	130	130
Total	1	1	2	150	145

All flying birds were outside of the breeding season and not attributable to the population for the North Caithness Cliffs SPA.

A single bird was seen on the ground during a vantage point survey in May 2023.

Peregrine was not seen Breeding Bird or raptor surveys and there is no suitable breeding habitat on the Proposed Development Site.

Peregrine occurs relatively infrequent in the Proposed Development Site and so it is considered that the Proposed Development has Less than Local importance for this species.

7.7 Ornithological Features Brought Forward for Consideration

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 potentially vulnerable to significant impacts from the Proposed Development in EIA terms.

Species for which the conservation evaluation was less than local are not included in this evaluation as their usage of the Proposed Development Site is so infrequent as to make it not possible for there to be significant impacts on those species.

Table 7-25 reviews the ornithological receptors described in the baseline and assesses which receptors will be brought forward for further assessment. It includes all species which have been assessed as having local or greater conservation value.

Table 7-25: Ornithological features brought forward for assessment

Receptor and distance from Proposed Development	Nature Conservation Evaluation	Brought forward for further assessment
Caithness Lochs SPA & Ramsar: 2.5 km	International	Yes. Greylag goose and Whooper swans have been seen on surveys for the Proposed Development, and are within the connectivity range of the Proposed Development so there is potential for impacts to occur
Caithness and Sutherland Peatlands SPA & Ramsar: 8.0 km	International	No. Common scoter, Golden plover and Hen harrier have been observed during surveys for the Proposed Development and are qualifying feature of this designated site. However, NS advised in their Scoping response that impacts could only occur if diver activity was observed and no diver activity was

Receptor and distance from Proposed Development	Nature Conservation Evaluation	Brought forward for further assessment
		observed. For other qualifying features the Proposed Development is too far from the SPA for species observed on or around the Proposed Development to form part of the SPA population. No diver activity was observed and so there can be no significant impacts on the SPA.
North Caithness Cliffs SPA: 5.8 km	International	No. Of the qualifying features of the SPA only Peregrine has been seen on the Proposed Development but in view of the low levels of occurrence, the distance of the site from the Proposed Development, and the fact that Peregrines observed may not form part of the SPA population given the distance between the SPA and the Proposed Development, effects on this site will not be assessed.
Flow Country cWHS 8.0 km	International	No. The ornithology species which are listed on the attributes of the cWHS are the same species for which the Caithness and Sutherland Peatlands SPA is designated. As such, NS' comment about impacts only occurring if diver activity was observed would apply here; the cWHS is too far from the Proposed Development for there to be any direct impacts on it, the only impacts would occur on birds commuting out to the Proposed Development, but due to the distance only the divers would be expected to travel this far from the Proposed Development. With no diver activity recorded there can be no impacts on the cWHS and as such it is not considered further.
Loch Durran SSSI 1.0 km	National	No. This site is not designated for any avian interest and is not within an SPA. THC advised of its importance for the population of Whooper swans using the Caithness Lochs SPA and Ramsar and this site and its proximity to this receptor is noted but will be assessed under the Caithness Lochs SPA & Ramsar rather than the SSSI per se.
Loch Scarmclate SSSI: 2.5 km	National	No. Although this SSSI underlies the Caithness Lochs SPA and Ramsar and its populations of Greylag goose and Whooper swan it is not possible to partition populations between underlying SSSIs, it will be assessed as part of the Caithness Loch SPA.
Loch Watten SSSI: 4.1km	National	No. Although this SSSI underlies the Caithness Lochs SPA and Ramsar and its populations of Greylag goose and Whooper swan it is not possible to partition populations between underlying SSSIs, it will be assessed as part of the Caithness Loch SPA.
Loch Heilen SSSI: 6.0 km	National	No. Although this SSSI underlies the Caithness Lochs SPA and Ramsar and its populations of Greylag goose and Whooper swan it is not possible to partition populations between underlying SSSIs. Loch Heilen is beyond connectivity distance for this species with respect to the Proposed Development. This site will be assessed as part of the Caithness Loch SPA for Greylag goose.
Dunnet Head SSSI: 7.8 km	National	No. Of the qualifying features of the SSSI only Cormorant and Herring gull have been recorded during surveys for the Proposed Development but because of their low levels of activity during the breeding season, and the distance of the site from the Proposed Development effects on this site will

Receptor and distance from Proposed Development	Nature Conservation Evaluation	Brought forward for further assessment
		not be assessed.
Shielton Peatlands SSSI: 9.9 km	National	No. Of the qualifying features of the SSSI, and forming part of its Breeding Bird assemblage, Greylag goose, Arctic skua, Golden plover, Hen harrier and Peregrine have all been seen during surveys for the Proposed Development. Connectivity ranges for these species during the breeding season would exclude all but Golden plover, which has a maximum range of 11km, but the only record of this species was pre-breeding flock which does not form part of the breeding population at this SSSI.
Loch of Wester SSSI: 10.6 km E	National	No. Whooper swan is a qualifying feature of the SSSI but the distance of the site from the Proposed Development is beyond the connectivity range of this species (NS, 2018).
Loch of Mey SSSI, 11.3 km NE	National	No. None of the qualifying features of species are within connectivity ranges specified under guidance (NS, 2018.
Loch Calder SSSI 11.9 km W	National	No. Although this SSSI underlies the Caithness Lochs SPA and Ramsar and its populations of Greylag goose, which is within the connectivity range of this species (Scottish Natural Heritage, 2018) it is not possible to partition populations between underlying SSSIs and it will be assessed as part of the Caithness Loch SPA.
Greylag goose	County	Yes. Considered due to activity on and around the Proposed Development, risk from wind farms and conservation status and importance as a qualifying feature for the Caithness Lochs SPA and several underlying SSSIs within connectivity range specified under guidance (Scottish Natural Heritage, 2018) Not considered with respect to breeding population at Sheilton Peatlands SSSI/ Caithness and Sutherlands Ramsar due to absence during most of the breeding season.
Pink-footed goose	Local	Yes. Considered due to activity on and around the Proposed Development, risk from wind farms and conservation status.
Whooper swan	Regional	Yes. Considered due to activity on and around the Proposed Development, risk from wind farms and conservation status and importance as a designatory feature for the Caithness Lochs SPA, Loch Scarmclate and Loch Watten SSSIs.
Lapwing	Local	Yes. Considered due to activity on and around the Proposed Development, risk from wind farms and conservation status.
Curlew	Local	Yes. Considered due to activity on and around the Proposed Development, risk from wind farms and conservation status.
Barn Owl	Regional	Yes. Considered due to activity on and around the Proposed Development, risk from wind farms and conservation status.

7.8 Mitigation and Enhancement Measures

In line with CIEEM guidelines, 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 project during construction and operation to ensure that effects on the IOFs are reduced. The Applicant would be content that these measures be conditioned.

7.8.1 Construction Phase

Details of construction mitigation measures will be provided in a Construction Environmental Management Plan (CEMP); a draft version is provided in Technical Appendix 15-1. The CEMP will be submitted to THC for approval, in consultation with NS, 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 to be prepared post-determination and in advance of the commencement of construction on the Proposed Development; and
- Construction works will be overseen by an Ecological Clerk of Works (ECoW) and their role and responsibilities will be detailed in the CEMP.

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.

Nests of non-Schedule 1 or Annex I 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.

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

Should the nest (or where applicable the roost) of an Annex I or Schedule 1 species be present, then disturbance buffers based on guidance, (Goodship & Furness, 2022), 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 without unlawful disturbance to the nest. The ECoW will be responsible for determining when breeding has ceased and thus when the buffer can be removed.

The location of the Barn owl breeding site is beyond the area where unlawful direct disturbance could occur on the nest during the breeding season so no specific mitigation is required. However, the breeding status will be confirmed by the ECoW during works and any works during the breeding season occurring outwith the Proposed Development Site will be reviewed to ensure there would be no disturbance to any active nests at this locale.

A toolbox talk will also be provided during the construction site induction process, detailing that there may be sensitive species on the Proposed Development Site during the construction 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 Schedule 1 status such as Barn owl and Hen harrier and will detail any restrictions on site working as a result of ornithological constraints.

7.8.2 Operational Phase

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

This has been provided in outline (Technical Appendix 6-4 Outline HMP) and a finalised HMP will be submitted to THC for approval, in consultation with NS, before construction commences. It aims to particularly improve the quality of peatland habitats on the Proposed Development Site.

The HMP includes measures to create a wildflower meadow within the battery storage field, at a distance of 700m and further from the nearest turbine and with potential to providing a rush-rich habitat which, as well as benefiting other non-avian species will provide foraging and breeding habitat for species such as Curlew and Lapwing.

There will also be the need to provide continuing bird monitoring at the Proposed Development. As described in the HMP this will be carried out in years one, three and five following the commencement of operation. Vantage point watches will be carried out in the non-breeding season to help to assess the effects of the wind turbines on habitat utilisation and the extent of flight path alteration and avoidance of the area by Whooper swan and Greylag goose. Breeding Bird Survey work will be carried out within the survey area used for baseline surveys to allow evaluation of site habitat management work.

7.9 Identification and Evaluation of Construction Phase Impacts

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.
- Disturbance and displacement as a result of human activity:
  - Included in this is consideration of barrier effects.

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

7.9.1 Designated Sites

Caithness Lochs SPA and Ramsar impacts

All infrastructure will be contained within the Proposed Development Site and there is no hydrological connectivity between the Proposed Development and the SPA so there will be no habitat loss or damage to the SPA. This also applies to Loch Durran SSSI which is known to be important for the SPA Whooper swan populations but which does not form part of this designated area (see Table 7-1).

Detailed assessment of the impacts of the Proposed Development on Whooper swan and Greylag goose is carried out under those species' sections. As a result, impacts on

the SPA and Ramsar will be considered under the assessment of the species level impacts.

7.9.2 Species

Greylag Goose

Greylag goose, a qualifying feature for the Caithness Lochs SPA and Ramsar and underlying SSSIs (Loch Scarmclate, Loch Watten and Loch Heilen), are known to use the area which holds the Proposed Development for feeding. As such, there is potential for disturbance/displacement on this species during the construction phase. Infrastructure will also remove habitat for foraging geese.

Disturbance/displacement during the construction period is likely to be of greater magnitude than during the operational phase due to the increased levels of human activity and machinery on the Proposed Development Site during construction. However, the duration will be limited, being a maximum of one winter season. While usage of the area in the vicinity of the Proposed Development did occur, it was relatively limited, with only three fields used on more than one occasion, and they were each used twice. While the surveys are a snapshot of usage, it suggests the population is highly mobile around the area and as such, given that and the large area available to them within commuting distance and the short-term nature of construction then the effects are considered to be minor and would not be considered significant. Confidence in this prediction is near certain.

The extent of indirect and direct habitat loss as a result of the infrastructure is very limited. A total of 2.78 ha would be lost to infrastructure, with up to 16.37 ha within 30m of infrastructure which could suffer disturbance. Given the area available to foraging geese, this would be assessed as a negligible impact and not considered to be significant. Confidence in this prediction is near certain.

With no significant impacts identified on Greylag goose during the construction phase, there would also be no significant impacts on the Caithness Lochs SPA and Ramsar Greylag goose populations.

Pink-footed goose

Pink-footed goose is known to use the area around the Proposed Development Site for feeding. As such, there would be some potential disturbance/displacement on this species during the construction phase. Infrastructure will also remove habitat for foraging geese.

Disturbance/displacement during the construction period is likely to be of greater magnitude than during the operational phase due to the increased levels of human activity and machinery on the Proposed Development Site during construction. However, the duration will be limited, being a maximum of one winter season.

The proposed disturbance distance for non-breeding Pink-footed geese in current guidance, (Goodship & Furness, 2022), is less than 500 - 1000m. If the larger 1km buffer is used to define the ZOI beyond the footprint of the Proposed Development this area is still very small compared to the total area of potential feeding habitat for this species in the vicinity of the Proposed Development. The mean number of birds recorded per field use survey was 150.8; of these an average of 112.1 birds were recorded in fields that are wholly or partially within 1 km of the development footprint. Set against the goose

population in the local area this is limited. As such it is considered that the effects of construction phase activities on Pink-footed goose would be minor. Confidence in this assessment is near certain.

The extent of direct and indirect habitat loss as a result of the infrastructure is very limited. A total of 2.78 ha would be lost to infrastructure, with up to 16.37 ha within 30m of infrastructure which could suffer disturbance. Given the area available to foraging geese, this would be assessed as a negligible impact and not considered to be significant. Confidence in this prediction is near certain.

Whooper Swan

Whooper swan, a qualifying feature for both Caithness Lochs SPA and underlying SSSIs (Loch Scarmclate, Loch Watten and Loch Heilen), is known to use the surroundings of the Proposed Development for feeding. As such, there would be some potential disturbance/displacement on this species during the construction phase. Infrastructure will also remove habitat for foraging swans.

Whooper swan field usage was mainly to the south of the Proposed Development, in the vicinity of Loch Scarmclate (Figure 7-1-21). Three fields immediately adjacent to the Proposed Development were each used once across the two years of surveys during surveys by small numbers of swans:

- Field 5 north of the Proposed Development – 7 swans present in February 2021;
- Field 49 west of the Proposed Development – 4 swans present in October 2020; and
- Field 59 south of the Proposed Development - 9 swans present December 2019.

The results of the surveys showed no strongly favoured or regularly used fields and usage was relatively low, with a mean 15.6 bird observed per survey across the whole survey area. Given that and the relatively short period over which construction disturbance would occur, likely to be no more than one winter season, this would be considered a negligible impact which would not rise to the level of significant. Confidence in this prediction is near certain.

The extent of indirect and direct habitat loss as a result of the infrastructure is very limited. A total of 2.78 ha would be lost to infrastructure, with up to 16.37 ha within 30m of infrastructure which could suffer disturbance. Given the area available to foraging geese, this would be assessed as a negligible impact and not considered to be significant. Confidence in this prediction is near certain.

With no significant impacts identified on Whooper swan during the construction phase, there would also be no significant impacts on the Caithness Lochs SPA population and thus on the SPA itself.

Lapwing

The extent of indirect and indirect habitat loss as a result of the infrastructure is very limited. A total of 2.78 ha would be lost to infrastructure, with up to 16.37 ha within 30m of infrastructure which could suffer disturbance. Habitat loss will not therefore have a significant effect on Lapwing due to the small extent of habitat due to be lost, considered to be negligible, either directly or indirectly. Confidence in this prediction is near certain.

Experience during wind farm construction has demonstrated that Lapwing are unlikely to suffer displacement effects during the construction phase. In Atmos' experience,

Lapwing has even been recorded breeding on recently constructed crane pads. There may be some limited disturbance effects which will be localised within the Proposed Development. As such, these will be considered negligible and not significant. Confidence in this prediction is near certain.

Curlew

Curlew bred in low numbers within the survey area. In 2020 there was a possible territory within Proposed Development Site and centred within about 200 m of the nearest turbine. In 2023 there was a possible territory around 1 km from the turbines and about 250 m from the Proposed Development Site boundary.

A study comparing bird populations at wind farms before and after construction (Pierce-Higgins *et al*., 2012) suggests that Curlew populations are likely to decline by about 40% within an area of around 620 m around turbine placements although other studies have not found this effect (Whitfield, 2010).

It is possible that disturbance could occur to breeding Curlew during the construction phase. However with only one pair identified, in one of the two years of survey in an area where disturbance could occur, impacts of disturbance will be short term and negligible and not significant. Confidence in this prediction is near certain.

The extent of indirect and direct habitat loss as a result of the infrastructure is very limited. A total of 2.78 ha would be lost to infrastructure, with up to 16.37 ha within 30m of infrastructure which could suffer disturbance to the habitat. While this would reduce Curlew foraging prospects during the construction phase, it is considered this would be a negligible effect. It is expected that less use would be made of this area due to construction activity so any impacts would not be additive to those identified for construction disturbance/displacement. As such, these impacts would be considered negligible and not significant. Confidence in this prediction is near certain.

Barn owl

Guidance for disturbance of breeding Barn owl suggests a buffer of between 50-100m (Goodship & Furness, 2022); this would put the nesting location outside the area where construction disturbance would occur. As such, there would be no disturbance impacts on breeding Barn owl, so they are assessed as negligible and not significant. Confidence in this is near certain.

The extent of indirect and direct habitat loss as a result of the infrastructure is very limited. A total of 2.78 ha would be lost to infrastructure, with up to 16.37 ha within 30m of infrastructure which could suffer disturbance to the habitat. This is relatively limited, but disturbed habitat is still likely to support prey species for Barn owl. As such, habitat loss during construction is considered to be negligible and not significant. Confidence in this is near certain.

7.10 Identification and Evaluation of Operational Phase Impacts

Greylag goose and Whooper swan are SPA species that winter in the area and move between and are variably partitioned across SSSIs within the wider SPA population. How barrier, collision and displacement effects are liable to fall on populations using these receptors as roosts and commuting to feeding areas outside of the protected areas are

considered in Section 7.10.1. The other species considered, are not qualifying species of designated sites and will be considered in more detail in Section 7.10.2. Pink-footed goose has similar behaviour in commuting between roosting and feeding locales and so barrier effects will also be taken into consideration. The remaining species, which include Lapwing and Curlew, will be considered more in context of their breeding behaviour.

A review on wind farm effects on goose and swan species (Rees, 2012) provides estimates on the ZOI of displacement effects and of barrier effects, as evinced by avoidance flight behaviour, in the vicinity of wind farms. There is some evidence that wind farms displace swans and geese in the range of 100-600 m from turbines and that flight avoidance behaviour, a response to a barrier effect, is elicited at the scale of hundreds of metres, which for the purpose of this assessment will be taken to mean 1km and less.

7.10.1 Designated Sites

Caithness Lochs SPA and Ramsar impacts

Caithness Lochs SPA and Ramsar is designated for populations of Whooper swan and Greylag goose, which overfly the Proposed Development and feed in fields in its vicinity Displacement and barrier effects and collision risks for Greylag goose and Whooper swan at the Proposed Development will all be considered to act on the SPA population.

The collision risks for the SPA qualifying features are summarised in Table 7-26.

Table 7-26: Summary of average collision risks

Species	Period	Corrected Annual Risk	Number of years to collison	Mortality over 30 years
Greylag goose	Year 1, 2019-20	2.041	0.490	61.23
	Year 2, 2020-21	0.701	1.427	21.03
	Mean	1.371	0.729	41.13
Whooper swan	Year 1, 2019-20	0.909	1.100	27.27
	Year 2, 2020-21	0.022	45.455	0.66
	Mean	0.466	2.146	13.98

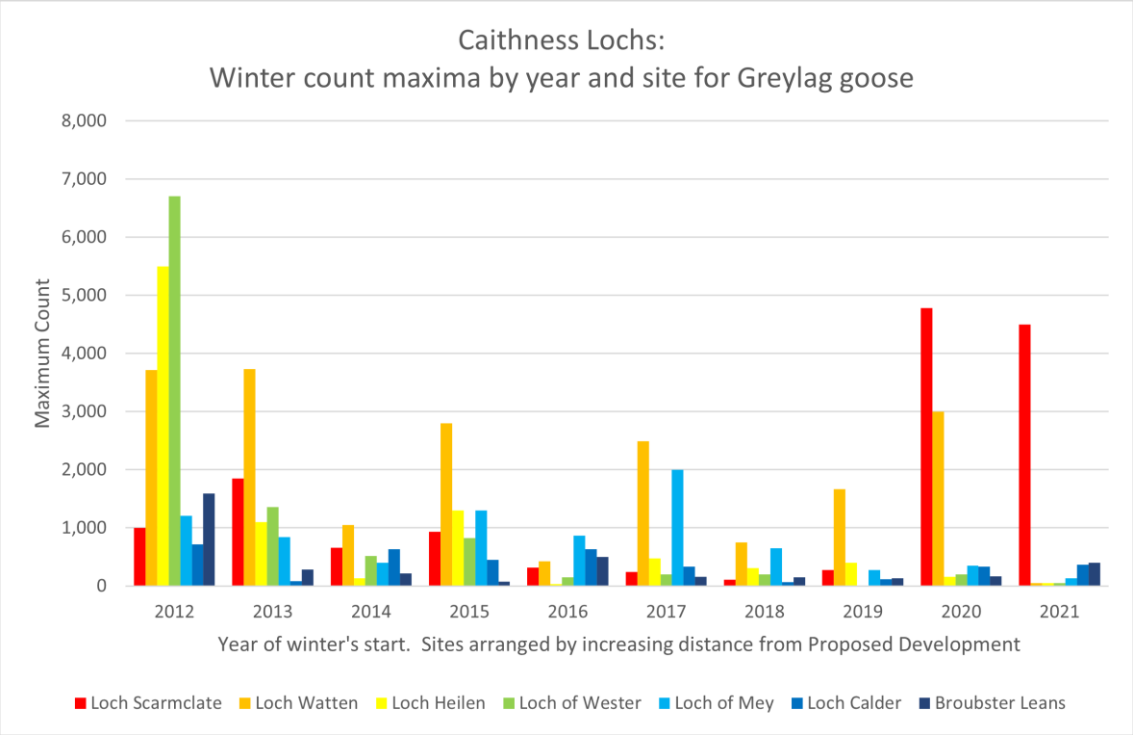
The Caithness Lochs SPA citation (NS, 1999) specifies a winter mean peak population of 7190 Greylag geese and 240 Whooper swans based on the winters of 1993/4 – 1997/8.

Using the most recent WeBS data (Austin, et al., 2023), and summing the peak counts for each constituent part of the SPA, the current five-year mean is approximately 5111 Greylag goose (2017/18 – 2021/22) and 702 Whooper swan.

Greylag Goose Caithness Lochs SPA Population impacts

Chart 7-4 shows maximum counts for Greylag goose with count sites (SSSIs) arranged by order of increasing distance over the past ten years for which we have records (2012/13 – 2021/22).

Chart 7-4 Peak winter counts for Greylag goose at the Caithness Lochs SPA



In recent years, lochs closer to the Proposed Development have held a greater proportion of the SPA population. There is no apparent reason for this; possible causes could include changes to land management or changes to roost suitability; water quality, disturbance levels, or even just chance that counts were taken on days when large numbers of birds were on one roost.

There was variability between the flight activity of the two years of survey, which resulted in variation in collision risk estimates, with collision risk estimated at between 0.071 and 2.041, with a mean collision risk of 1.371 birds per annum. Despite the current population being smaller than at time of designation, the population is assessed as favourable maintained, and annual mortality of approximately one bird per year would not cause this to change. As such additional mortality is assessed as negligible and not significant. Confidence in this prediction is near certain.

Guidance on displacement of geese around wind farms (NatureScot, 2014) suggests that worst case scenario for goose displacement around turbines is the entire turbine envelop plus 100m buffer. Other distances quoted in a review paper (Rees, 2012) for this species suggest displacement distances of between 200-250m from turbines.

Figure 7-1-20 shows the distribution of geese observed during the goose foraging surveys. Fields used on more than one occasion were fields 146, 352 and 353. All had Greylag goose observed on two occasions during the two years of survey. All other fields which recorded geese present were used on only one occasion. This does suggest that either geese forage across a very large number of fields across the winter months or that there are no particularly preferred fields within the survey area and thus in proximity to the Proposed Development.

Table 7-27 shows the distance between the Proposed Development and selected fields used by Greylag geese.

Table 7-27: Distance between fields used by Greylag geese and the Proposed Development

Field number	Distance to Proposed Development Boundary	Distance to Nearest Turbine
5	80m	580m
9	Partially included within	100m
12	15m	590m
49	15m	1190m
94	850m	1275m
353	910m	1260m
361	1120m	1100m

Usage in close proximity to the Proposed Development was limited, with only one field within 500m of turbines - Field 9 which was used on one occasion by 37 Greylag geese. Field 49 is close to the field which will contain the battery storage. Use of this field by Greylag geese was also recorded on one occasion, when a single Greylag goose was recorded.

As a result, if displacement around the turbines or battery storage was to occur, the effects would be limited to a small area, due to the small turbine envelope, where goose occupancy was very intermittent and only small numbers were recorded. The disturbance impact would therefore be assessed as negligible and not significant as it is not expected the distribution of Greylag goose would be affected by the Proposed Development. Confidence in this prediction is probable, due to the variability of use of fields by Greylag goose.

Information on the response of Greylag goose to barriers is provided in a review carried out by Rees (Rees, 2012) and in NS guidance (NatureScot, 2014). It is important to note that the Proposed Development is outwith the sensitive 1.5km buffer outlined in guidance for geese from the nearest SPA designated lochs. The small scale of the Proposed Development, consisting of two turbines would not prevent Greylag goose accessing feeding and roosting sites in the area.

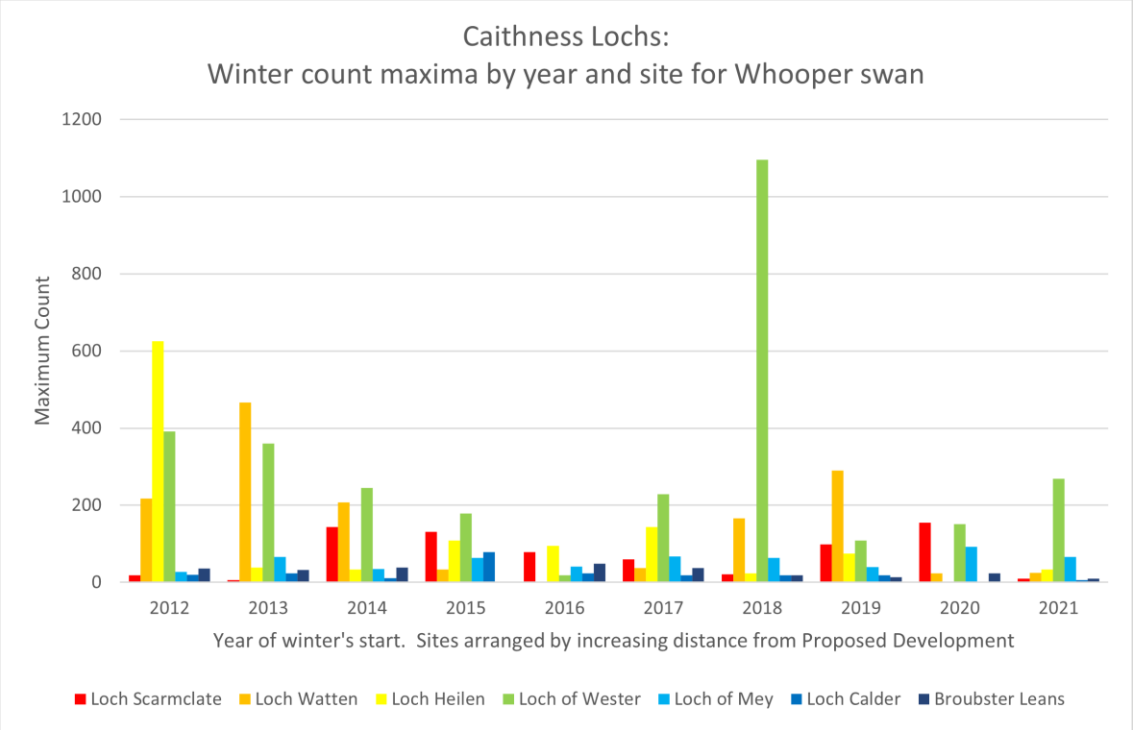
Additionally, the alignment of the turbines relative to the local roosts presents a somewhat reduced profile for birds exiting northwards (or returning southwards) to Loch Scarmclate, as birds tend to fly parallel to the Proposed Development rather than perpendicular to it. For those birds observed turning to the northeast while flying out from Loch Scarmclate, with only two turbines, the distance birds would need to alter their path to avoid the Proposed Development would be limited by the small scale of the Proposed Development Site. Migrant geese have been observed avoiding windfarms by some relatively large distances, but wintering/locally feeding birds have been recorded making much smaller avoidance movements. Given the small spatial spread of the Proposed Development, if barrier effects occur, additional energetic constraints as a result would be limited and not sufficient to cause additional mortality. There would be no displacement as a result of inaccessibility of roosts or feeding sites as a result of barrier effects. As such, barrier effects are therefore considered negligible and not significant. Confidence in this prediction is near certain.

With no significant impacts on the SPA population, there would therefore be no significant impacts on the SPA with respect to Greylag goose.

Whooper Swan Caithness Lochs SPA population

Chart 7-5 shows counts for Whooper swan at Loch Scarmclate for the last 10 available recorded years in the context of other Caithness Lochs SPA populations.

Chart 7-5 Peak winter counts for Whooper swan at the Caithness Lochs SPA



Collision risk for Whooper swan was esimated at between 0.022 – 0.909 birds per year, with a mean of 0.466 and an estimated 14 birds lost over the lifetime of the Proposed Development.

The current population (estimated at approximately 702 birds) is greater than at time of citation, although there have been population fluctuations over this time. As such, given evidence of population growth and a relatively robust population, mortality of this level is likely to be within the annual fluctuations in mortality and as such would not be discernable against natural mortality. As such, the impact would be negligible and not signfiicant. Confidence in this prediction is near certain.

With respect to potential displacement due to the presence of the turbines and the battery storage facility, Whooper swan field usage was mainly to the south of the Proposed Development, in the vicinity of Loch Scarmclate (Figure 7-1-21). Three fields immediately adjacent to the Proposed Development were each used once across the two years of surveys during surveys by small numbers of swans:

- Field 5 north of the Proposed Development – 7 swans present in February 2021;
- Field 49 west of the Proposed Development – 4 swans present in October 2020; and
- Field 59 south of the Proposed Development - 9 swans present December 2019.

Rees (Rees, 2012) reported that studies showed typical displacement of swans around operational windfarms was up to 600m from the turbines. Table 7-28 shows the distance between selected fields used by Whooper swan (selected on the basis of their usage and proximity to the Proposed Development).

Table 7-28: Distance between fields used by Whooper swans and the Proposed Development

Field number	Distance to Proposed Development Boundary	Distance to Nearest Turbine
5	80m	580m
49	15m	1190m
59	Adjacent	750m
72	490m	1580m
82	460m	1470m
87	875m	1950m

Of these, only one field lies within 600m of the turbines and that was used on one occasion during surveys, with seven swans present. Fields 49 and 59 may also see some displacement as a result of the battery storage immediately adjacent to those fields. The battery storage may create a visual barrier to grazing swans which mean they may avoid grazing too close to it due to perceived increased predation risk. However, it is not considered this would lead to complete displacement; birds will likely avoid feeding close to the battery storage as they may avoid other building like structures. It is noted that Field 87, the field with the highest mean usage, has farm buildings in the southwest corner. In addition, observed use of the fields in the vicinity of the proposed battery storage was very occasional.

For all other fields, the distance from the turbines means there would be expected to be no displacement effects on fields used by Whooper swans during the survey period. Although field usage can vary year to year, given the small footprint of the Proposed Development, the displacement effects will be limited across the area and the historical records do not indicate greater use of the area which may be subject to displacement effects. As such, the impact of displacement on foraging Whooper swans is considered to be negligible and not significant. Confidence in this prediction is near certain.

Information on the response of swans to barriers is provided in a review carried out by Rees (Rees, 2012).

The small scale of the Proposed Development Site will not create such a large barrier that Whooper swans would be prevented from accessing feeding areas or roosting sites.

Additionally, the alignment of the turbines relative to the local roosts presents a somewhat reduced profile for birds exiting northwards (or returning southwards) to Loch Scarmclate, as birds tend to fly parallel to the Proposed Development rather than perpendicular to it. For those birds observed turning to the northeast, with only two turbines, the distance birds would need to alter their path to avoid the Proposed Development would be limited by the small scale of the Proposed Development Site. While migrant geese and swans have been observed avoiding windfarms by some relatively large distances, locally feeding birds have been recorded making much smaller avoidance movements. Given the small spatial spread of the Proposed Development, if barrier effects occur, additional energetic constraints as a result would be limited and not sufficient to cause additional mortality. There would be no displacement as a result of inaccessibility of roosts or feeding sites as a result of barrier effects. As a result, the impact would be assessed as negligible and not significant. Confidence in this prediction is near certain.

7.10.2 Species

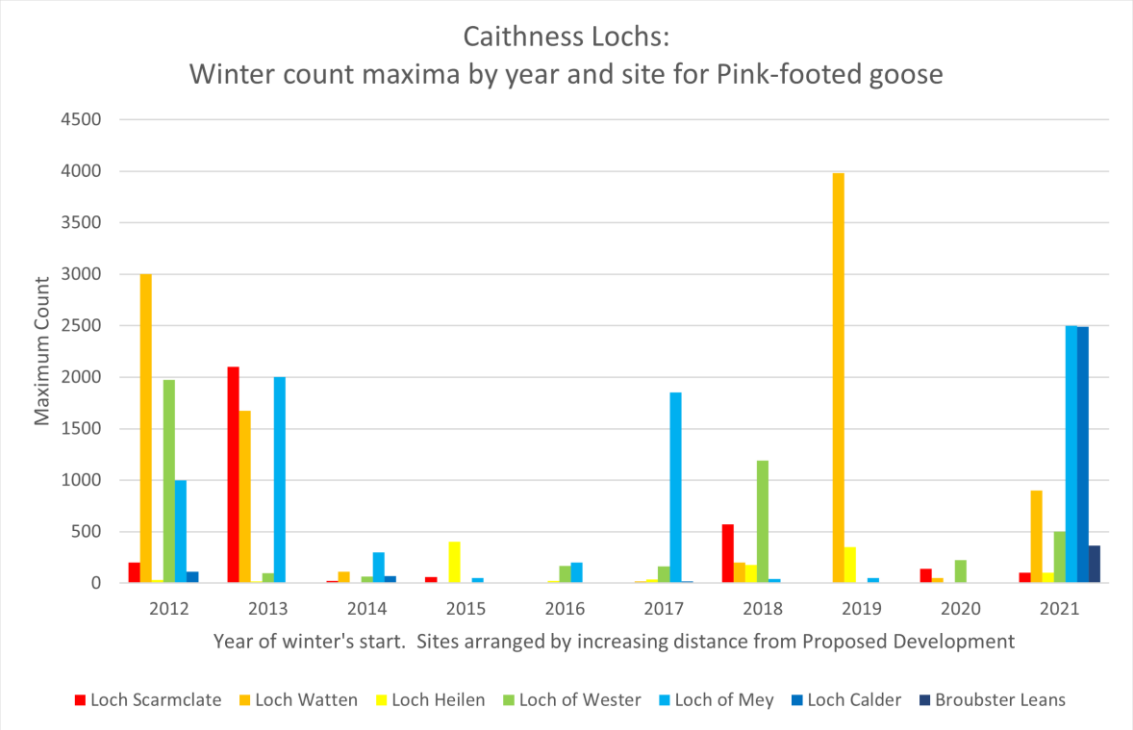
Greylag Goose

Impacts on the SPA Greylag goose population are assessed in section 7.10.1. However, the arguments presented there would hold true for NHZ population level assessment, as well. The NHZ population is larger than the SPA population, including birds on Orkney and as such, if there are no significant effects on the SPA population, there will not be any significant effects on the NHZ population either.

Pink-footed goose

Chart 7-6 shows maximum counts for Pink-footed goose with count sites (SSSIs) arranged by order of increasing distance over the most recent 10 winter periods for which there are records, i.e. between autumn 2012 and spring 2021.

Chart 7-6 Peak winter counts for Pink-footed goose at local roosts sites



The use of the surrounding lochs as roosts by Pink-footed geese over the last ten years has been variable. Loch Watten, the second closest count location to the Proposed Development has had the two highest counts over the period. However Lochs Mey and Calder have also held important counts.

Observations of flight activity (Technical Appendix Figures 1-7-9 to 11 and section 7.6.2), show considerable flight activity between Loch Scarmclate and feeding use of some the fields to the north and east of the Proposed Development, particularly in the first year of survey. As discussed above the winter of 2019-2020 WeBS counts showed a massive local increase in Pink-footed goose populations with the largest single site SPA WeBS count in the last decade and this seems to be reflected in recorded flight activity (Section 7.6.2). The large numbers present on Loch Wattten during the survey period, which is not reflective of the usage over the past ten years, may mean activity in the

vicinity of the Proposed Development has been over-estimated and so the impact assessment may be being carried out in a worst case scenario.

Table 7-29 shows estimates for collision risks for Pink-footed goose.

Table 7-29: Collision risk estimate for Pink-footed Goose

	Corrected Annual Risk	No. of years per collision	Number of birds colliding over 30 years
September 2019-August 2020	2.652	0.377	79.547
September 2020 – May 2021	0.016	61.231	0.490
Mean	1.334	0.750	40.018

With a mean of just over one bird estimated lost per year, against an NHZ population estimate of 20,746 birds, (Wilson, 2015), collision mortality would be assessed as neglgible and not significant for this species. Confidence in this assessment in near certain.

There is some evidence that wind farms displace geese and a literature review (Rees, 2012) cites three studies of Pink-footed goose displacement that indicate a displacement range of between 30m and 200m and a further study suggesting a displacement range of 600m but also noting that birds were later seen within the wind farm site post-construction. NatureScot (NS 2014) quotes a figure for displacement of geese from the wind turbine envelope (which is understood to be 500m) plus 100m but also mentions that this is a worst case scenario and that geese may habituate to wind turbines. Rees also quoted a source which showed that displacement effects for Pink-footed goose are worse for clustered layouts than for single or linear layouts (such as the Proposed Development). It seems reasonable to conclude that a displacement of up to 200 m is most likely to apply in this case. Table 7-30 shows the distance between the fields used which were closest to the Proposed Development and the Proposed Development boundary as well as the nearest turbine location.

Table 7-30: Distance between fields used by Pink-footed goose and the Proposed Development

Field number	Distance to Proposed Development Boundary	Distance to Nearest Turbine
5	80m	580m
9	Partially included within	100m
12	15m	590m
17	270m	335m
18	Partially included within	On field boundary
26	260m	710m
73	210m	980m

From this it can be seen that most fields used, including field 17 which had the highest use, lie outwith the 200m likely disturbance distance. Field 17 does lie within the 600m distance at its closest point, but it is a large field and the further points are just over one kilometre away.

There is therefore potential for limited disturbance to occur, with two fields currently used (fields 9 and 18) potentially no longer being available for grazing geese. Field 9

held 9 birds on one occasion; field 18 held 250 birds on one occasion. As such, the effect of displacement would appear to reduce availability to fields which were used very occasionally and would thus be assessed as minor and not significiant. Confidence is probable on this prediction.

The scale of the effect of flight avoidance behaviour for geese moving between feeding and roosting sites is reported to be on the scale of hundreds of metres (Rees, 2012) with figures for species and contexts showing wide variation. The only figure provided for an onshore windfarm, for which figures are likely to concern commuting populations, suggests that avoidance behaviour is exhibited in the range of 200m or more. NatureScot guidance (NatureScot 2014) suggests that barrier effects on geese at over 1.5 km from an SPA are unlikely to have a significant effect. This guidance also mentions how the relative orientation of turbine layout to the prevailing flight path can influence the severity of barrier effects with a parallel layout, as here, having a lesser effect. Given the small scale of the Proposed Development and the aspect which sees the orientation lying along the most commonly used flight routes, not perpendicular to it, the effects of barrirer effects would be assessed as negligible and not significant. Confidence in this prediction is near certain.

Whooper Swan

Impacts on the SPA Whooper swan population are assessed in section 7.10.1. However, the arguments presented there would hold true for NHZ population level assessment as well. The NHZ population is larger than the SPA population, including birds on Orkney and as such, if there are no significant effects on the SPA population, there will not be any significant effects on the NHZ population either.

Lapwing

There is no evidence of displacement of Lapwing from wind farms and barrier effects do not apply beyond the range of displacement for territory-holding birds. As a result, it is considered the impacts of these would be negligible and not significant. Confidence in this is near certain.

Table 7-31 below shows the estimated collision risk for Lapwing. The collision risk model has predicted the loss of approximately one bird every year for the lifetime of the Proposed Development. While there is no firm estimate for Lapwing breeding in Caithness, the population is likely large enough to withstand an additional one bird per year. Additionally, part of that estimate comes from four flights of 150 birds in August 2023 which contributed more than 100,000 bird seconds at risk; more than 90% of the collision risk estimate. This is likely to not fall on territorial breeding birds but on post breeding/migration populations which may or may not form part of the Caithness breeding population.

Table 7-31: Collision risk estimate for Lapwing

Year	Corrected Annual Risk	No. of years per collision	Number of birds colliding over 30 years
Year 1	0.009	117.577	0.255
Year 2	0.198	5.054	5.936
Year 3	2.557	0.391	76.712
Mean	0.921	1.086	27.634

As a result, the impact of collision risk on the Lapwing population is assessed as minor and not significant. Confidence in this assessment is probable.

Curlew

A negative impact on Curlew as a result of displacement from around wind farm sites was established in two paper (Pearce-Higgins, 2009) (Pearce-Higgins, 2012). In the study where a negative effect was found (Pearce-Higgins et al., 2012) The 2009 paper concerned foraging Curlew while the 2012 paper considered the effects on breeding Curlew identifying a loss of 40% of breeding territories within 620m of turbines, which persisted into the operational stage.

There was one territory within 620m of the turbines in one of the two years of survey. Even if this is lost entirely, even taking account of the currently falling Curlew population, this loss set against the estimated NHZ population of 3233 breeding pairs (Wilson, et al., 2015) would be considered minor and not significant. Confidence in this is near certain. Additionally, habitat enhancement has been identified which would improve foraging habitat for this species and help support the surrounding population. As discussed in Section 7.8.2 an HMP has been proposed that includes management of approximately 10 $ha^{-1,}$ outside the ZOI described above, to create M23 *Juncus effusus*/acutiflorus – *Galium palustre* rush-pasture, which has the potential to provide ground cover for nesting birds including Curlew.

Table 7-32 below shows the estimated collision risk for Curlew. The collision risk model has predicted the loss of less than one bird over the lifetime of the Proposed Development; this figure would be even lower if displacement of the single territory was to occur. Collision risk is therefore assessed as negligible and not significant. Confidence in his prediction is near certain.

Table 7-32: Collision risk estimate for Curlew

Year	Species	Corrected Annual Risk	No. of years per collision	Number of birds colliding over 30 years
Year 1	Curlew	0.005	185.995	0.161
Year 2	Curlew			0.000
Year 3	Curlew	0.023	43.335	0.692
Mean	Curlew	0.014	70.292	0.427

Barn Owl

There is no evidence that displacement would occur as a result of the installation of infrastructure in the vicinity of Barn owl's nest. Barn owl tend to adapt readily to human infrastructure and would not be expected to show any displacement. Experience from post construction monitoring on one site in England with a Barn owl box installed showed Barn owls continued to use the box; as a result impacts would be assessed as negligible and not significant. Confidence in this is near certain.

There was no estimate of collision risk made for Barn owl, although this may be related to timing of surveys and timing of activity. While NS regards Barn owl as not being at risk from wind farms, collisions with Barn owls have occurred. At the same time, the small scale of the Proposed Development and the distance between the nest site location and the turbines themselves will greatly reduce collision risk such that the risk would be

qualitatively assessed as minor and not significant. Confidence in the prediction is probable.

7.11 Cumulative Assessment

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.

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. 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. 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).

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. 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.

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. 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, or 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). 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 NS, that implementation of mitigation and compensation measures will reduce the overall impacts.

A request was made to NS for information from their cumulative database on wind farms and other projects in NHZ 2, North Caithness area and this was combined with the results of a data search carried out for Orkney developments. Sites were searched for developments of three or more turbines with a tip height of more than 50m. Smaller developments are less likely to have quantitative data or may not have an EIA Report but are considered in combination with data from smaller developments documented in NS's own cumulative database.

Records of planning refusals more than two years old and projects which have been scoped more than five years ago have been omitted. Four sites for which information was provided by NS were excluded, namely Bower Quarry, and Balmore and Burnside

small wind farm schemes which have been refused planning permission. Collision risk modelling data available is compared for the species for which collision risk assessment has been carried out for the Proposed Development. Due to the size of the NHZ, a number of wind farms are beyond the range at which connectivity for any species could occur. Those are included to provide information on NHZ level effects. In total 30 developments fulfilling these criteria were identified. The source information regarding collision risk modelling lacks information on Lapwing and Curlew, perhaps because it is more recently that Curlew and Lapwing populations have been identified as potentially at risk and so a qualitative cumulative collision risk assessment has not been carried out for those species. Table 7-33 shows the developments included in the cumulative assessment.

Table 7-33: Overview of Wind Farm Developments in NHZ 2, North Caithness and Orkney

Wind Farm Name	Distance and Direction	County	Status	Number of turbines	Species under assessment for which Collision risk modelling is available[1].
Weydale	6.3 km WNW	Highland	Operational	1	Whooper swan, Greylag goose, Pink-footed goose
Slickly	6.6 km ENE	Highland	Approved	11	Whooper swan, Greylag goose
Lochend	7.4 km NE	Highland	Operational	4	Whooper swan, Greylag goose, Pink-footed goose
Cogle Moss	7.7 km NW	Highland	Approved	12	Whooper swan, Greylag goose, Pink-footed goose
Hollandmey	8.5 km NE	Highland	Application	10	Greylag goose
Torranshandoll 2	9.1 km SW Approx.	Highland	Unknown[2]	Unknown	Whooper swan, Greylag goose
Watten Wind Farm	9.7 km S	Highland	Application	7	Whooper swan, Greylag goose, Pink-footed goose
Thurso Waste Water Treatment Works	9.8 km NW	Highland	Operational	1	Greylag goose
Stroupster	11.4 km E	Highland	Operational	12	Whooper swan, Greylag goose
Flex Hill	11.5 km NNW	Highland	Operational	3	Whooper swan, Greylag goose, Pink-footed goose
Rattar Mains	12.0 km N	Highland	Operational	1	Whooper swan, Greylag goose
Wathegar	12.7 km SSE	Highland	Operational	5	Whooper swan, Greylag goose

[1] Designatory species for Caithness Lochs SPA and Pink-footed goose.

[2] The status of this development is unclear but, precautionarily, data is included within the assessment; distance provided for Torranshandoll windfarm.

Wind Farm Name	Distance and Direction	County	Status	Number of turbines	Species under assessment for which Collision risk modelling is available[1].
Wathegar 2	13.4 km SSE	Highland	Operational	9	Greylag goose, Pink-footed goose
Cairnmore Hill	13.4 km WNW	Highland	Application	5	Whooper swan, Greylag goose, Pink-footed goose
Achairn	14.7 km SE	Highland	Operational	3	
Baillie Hill	14.7 km W	Highland	Operational	21	Whooper swan, Greylag goose
Hill of Lybster	18.7 km WNW	Highland	Approved	1	Greylag goose, Pink-footed goose
Forrs 2	19.0 km WNW	Highland	Operational	4	Whooper swan, Greylag goose
Forss 3 Extension	19.0 km WNW	Highland	Operational	4	Greylag goose
Forss Extension	19.2 km WNW	Highland	Operational	4	
Rumster Community WF	21.3 km S	Highland	Permitted	3	Greylag goose
Hoy	30.2 km N	Orkney	Approved	6	
Hesta Head	33.7 km NE	Orkney	Approved	5	
Barns of Ayre	51.2 km NE	Orkney	Operational	3	
Quanterness	53.3 km NNE	Orkney	Approved	6	Greylag goose
Hammars Hill	60.8 km NNE	Orkney	Operational	5	
Costa Head	65.7 km N	Orkney	Approved	4	
Bu Farm	71 km NE	Orkney	Approved	3	
Faray	79.1 km N	Orkney	Application	6	Greylag goose
Spurness	80.3 km NNE	Orkney	Operational	5	

Table 7-34 provides 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. Also detailed is whether the impacts are considered to have bearing on the Caithness Lochs SPA, for each windfarm-species record for which this is not recorded the collision risk estimate is either absent or approximately zero and so does not influence the outcome of the assessment.

Table 7-34: Collision risk estimates for Wind Farms acting on Caithness Lochs SPA and NHZ 2 on species assessed at the Proposed Development

Wind Farm Name	Distance and Direction from the Proposed Development	Status	Number of Turbines	Consideration as part of Caithness Lochs SPA population		Annual Collision risk		
				Whooper swan	Greylag goose	Whooper swan	Greylag goose	Pink-footed goose
Swarclett	N/A	The Proposed Development		Yes	Yes			
Achairn	14.7 km SE	Operational	3					
Baillie Hill	14.7 km W	Operational	21	Yes	Yes	0.05	2.936	
Barns of Ayre	51.2 km NE	Operational	3					
Flex Hill	11.5 km NNW	Operational	3	Yes	Yes	0.0625	0.266	0.716
Forrs 2	19.0 km WNW	Operational	4	Not recorded	Yes	0	0.272	
Forss 3 Extension	19.0 km WNW	Operational	4		Yes		0.386	
Forss Extension	19.2 km WNW	Operational	4					
Hammars Hill	60.8 km NNE	Operational	5					
Lochend	7.4 km NE	Operational	4	Yes	Yes	0.065	0.54	5.58
Rattar Mains	12.0 km N	Operational	1	Yes	Yes	0.0675	0.0208	
Spurness	80.3 km NNE	Operational	5					
Stroupster	11.4 km E	Operational	12	Not recorded	Not recorded	0	0	
Watheg ar	12.7 km SSE	Operational	5	Not recorded	Not recorded	0	0	
Watheg ar 2	13.4 km SSE	Operational	9		Yes		0.67	0.26
Weydale	6.3 km WNW	Operational	1	Yes	Yes	0.02	0.36	0.023529412
Bu Farm	71 km NE	Approved	3					
Cogle Moss	7.7 km NW	Approved	12	Yes	Yes	0.2017	8.79	10.57

Wind Farm Name	Distance and Direction from the Proposed Development	Status	Number of Turbines	Consideration as part of Caithness Lochs SPA population		Annual Collision risk		
				Whooper swan	Greylag goose	Whooper swan	Greylag goose	Pink-footed goose
Costa Head	65.7 km N	Approved	4					
Hesta Head	33.7 km NE	Approved	5					
Hill of Lybster	18.7 km WNW	Approved	1		Yes		2.68	0.25
Hoy	30.2 km N	Approved	6					
Quanterness	53.3 km NNE	Approved	6				0.15	
Rumster Community WF	21.3 km S	Approved	3				0.3508	
Slickly	6.6 km ENE	Approved	11	Yes	Yes	0.04	0.56	
Thurso Waste Water Treatment Works	9.8 km NW	Approved (Screening Application EIA not required)	1		Yes		0.04	
Cairnmore Hill	13.4 km WNW	Application	5	Yes	Yes	0.035	0.557	7.7946
Faray	79.1 km N	Application	6				0.1	
Hollandmey	8.5 km NE	Application	10		Yes		0.75	
Watten Wind Farm	9.7 km S	Application	7	Yes	Yes	0.2321	0.4099	0.0007
Torranshandoll 2	9.1 km SW	Not Found, no details on planning website and appears not to have been built [3]	no	Yes	Yes	0.0045	0.08	

[3] There was no information regarding this development; distance was estimated from the distance of Toranshandall 1 which was refused at appeal. Torranshandall 2 is not included in tables below as a view of satellite imagery didn't reveal any sites in the area that were not accounted for by our GIS coverage.

7.11.1 Designated Sites

Caithness Lochs SPA and Ramsar

Table 7-35 provides the cumulative annual estimates for the species for the species for which we have considered collision risk at the Proposed Development and for which we have cumulative data from NS. Numbers have been rounded to three decimal places where appropriate.

Table 7-35: Summary of Collision risks for Caithness Lochs SPA

Annual collision risk	Greylag goose	Whooper swan
Swarclett	1.371	0.466
Operational sites	5.451	0.265
Approved sites	12.070	0.242
Total Operational and Approved including Swarclett	18.891	0.972
Sites: in Planning (excluding Swarclett)	1.817	0.036

For Greylag goose the estimated annual mortality for birds at the Proposed Development is about 2 birds every three years. In total, this would increase the cumulative collision risk for the SPA to approximately 19 birds per year, although not all of this risk may fall on SPA population, as there may be some breeding risk included in this estimate. This scale of mortality is not considered likely to have a significant effect on the population of this SPA, designated for a population of Greylag geese with a mean winter peak of 7190 (NS, 2023). As discussed in section 7.10.2 barrier and displacement effects for Greylag geese at the Proposed Development are not considered to be significant. There are no other nearby developments which could combine with the impacts of the Proposed Development to raise those impacts to be considered significant. Confidence in these assessments is considered to be near certain.

For Whooper Swan the estimated annual mortality for birds at the Proposed Development is about 1 bird every two years. In total, the cumulative estimate for Whooper swan is approximately 1 bird per year. Given the current population, greater than at time of designation, this would be considered negligible and not significant. As discussed in section 7.10.2 barrier effects for Whooper swan at the Proposed Development are not considered to be of a significant level. There are no other nearby developments which could combine with the impacts of the Proposed Development to raise those impacts to be considered significant. Confidence in these assessments is considered to be near certain.

7.11.2 Species

Table 7-36 provides the cumulative annual estimates for the species for which we have considered collision risk at the Proposed Development and for which there is cumulative data from NS.

It should be noted that these numbers are very similar to those for the SPA assessment, because of the considerable overlap between the developments included for the SPA and those considered for the NHZ.

Table 7-36: Summary of Collision risks for NHZ 2

Annual collision risk	Greylag goose	Pink-footed goose	Whooper swan
Swarclett	1.371	1.334	0.466
Operational Sites	5.451	6.580	0.265
Approved Sites	12.571	10.820	0.242
Sites: Operational, Under Construction, Approved & Swarclett	19.392	12.154	0.972
Sites: in Planning (excluding Swarclett)	1.897	8.027	0.242

Given no significant adverse effects were found for the SPA populations of Greylag goose and Whooper swan, it would also follow there would be no adverse effects on the NHZ populations for those species in this location.

Pink-footed goose

With an estimate of 1.3 collisions per a year due to the Proposed Development, this brings the estimated cumulative collision risk to approximately 12 birds per year. Against a peak winter population for the NHZ that was estimated as 20,746 (Wilson, 2015), which may then be enhanced by the passage of Pink-footed goose from other wintering populations through the area this is a comparatively small figure. As a result, collision risk is considered negligible and not significant.

Lapwing

Assessment of cumulative collision risk for Lapwing has not been possible due to the lack of available data on collision risks.

With no other developments in proximity to the Proposed Development, cumulative effects of disturbance/displacement and barrier effects would be those due to the Proposed Development which are already assessed as not significant.

Curlew

Assessment of cumulative collision risk estimates for Curlew has not been possible due to the lack of available data on collision risks.

With no other developments in proximity to the Proposed Development, cumulative effects of disturbance/displacement and barrier effects would be those due to the Proposed Development which are already assessed as not significant.

Barn owl

No cumulative assessment of collision risk for Barn owl was now possible. With no other developments in proximity to the Proposed Development, cumulative effects of disturbance/displacement would be those due to the Proposed Development which are already assessed as not significant.

7.12 Summary of Residual Effects

Table 7-37 presents the residual effects.

Table 7-37: Summary of Residual effects for the Proposed Development

Receptor	Evaluation	Assessment carried out	Construction phase		Operational phase		
			Habitat loss	Disturbance	Displacement effects	Barrier effects	Collision risk
Caithness Lochs SPA and Ramsar	International	Yes	Negligible, not significant	Minor, not significant	Negligible, not significant	Negligible, not significant	Negligible, not significant
Caithness and Sutherland Peatlands SPA & Ramsar	International	No	-	-	-	-	-
North Caithness Cliffs SPA	International	No	-	-	-	-	-
Loch of Durran SSSI	National	No	-	-	-	-	-
Loch Scarmclate SSSI	National	Assessed as per the Caithness Lochs SPA					
Loch Watten SSSI	National	Assessed as per the Caithness Lochs SPA					
Loch Heilen SSSI	National	Assessed as per the Caithness Lochs SPA					
Dunnet Head SSSI	National	No	-	-	-	-	-
Shielton Peatlands SSSI	National	No	-	-	-	-	-
Loch of Wester SSSI	National	Assessed as per the Caithness Lochs SPA					
Loch of Mey SSSI	National	Assessed as per the Caithness Lochs SPA					
Loch Calder SSSI	National	Assessed as per the Caithness Lochs SPA					
Greylag goose	County	Yes	Negligible, not significant	Minor, not significant	Negligible, not significant	Negligible, not significant	Negligible, not significant
Pink-footed goose	Local	Yes	Negligible, not significant	Minor, not significant	Negligible, not significant	Negligible, not significant	Negligible, not significant
Whooper swan	Regional	Yes	Negligible, not significant	Negligible, not significant	Negligible, not significant	Negligible, not significant	Negligible, not significant
Lapwing	Local	Yes	Negligible, not significant	Negligible, not significant	Negligible, not significant	Negligible, not significant	Minor, not significant
Golden Plover	Less than Local	No	-	-	-	-	-
Curlew	Local	Yes	Negligible, not significant	Minor, not significant	Minor, not significant	Negligible, not significant	Negligible, not significant
Whimbrel	Less than Local	No	-	-	-	-	-
Snipe	Less than Local	No	-	-	-	-	-
Redshank	Less than Local	No	-	-	-	-	-
Herring gull	Less than Local	No	-	-	-	-	-

Receptor	Evaluation	Assessment carried out	Construction phase		Operational phase		
			Habitat loss	Disturbance	Displacement effects	Barrier effects	Collision risk
Arctic Skua	Less than Local	No	-	-	-	-	-
Cormorant	Less than Local	No	-	-	-	-	-
Osprey	Less than Local	No	-	-	-	-	-
Hen Harrier	Less than Local	No	-	-	-	-	-
Barn Owl	Regional	Yes	Negligible, not significant	Negligible, not significant	Negligible, not significant	-	Minor, not significant
Peregrine	Less than Local	No	-	-	-	-	-

7.13 Conclusions

Having carried out an impact assessment of the impacts of the Proposed Development on the ornithological receptors present on or around the Proposed Development, no significant effects in terms of the EIA regulations have been identified. With the mitigation described implemented, the Proposed Development can proceed without significant adverse impacts on the ornithological receptors.

7.14 References

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