CONTENTS

INTRODUCTION	9-1
CONSULTATION	9-1
METHODOLOGY	
Field Survey	
Collision Risk Modelling	
Assessment Methods	9-10
BASELINE RESULTS	
Designated Sites	
Species	
FUTURE BASELINE	9-36
TOTORE DAGLERE	
Ornithological Features Brought Forward for Assessment	
Ornithological Features Brought Forward for Assessment	
Ornithological Features Brought Forward for Assessment IDENTIFICATION AND EVALUATION OF KEY IMPACTS Mitigation Measures	
Ornithological Features Brought Forward for Assessment	
Ornithological Features Brought Forward for Assessment	
Ornithological Features Brought Forward for Assessment	
Ornithological Features Brought Forward for Assessment	
Ornithological Features Brought Forward for Assessment	



INTRODUCTION

- 9.1 This Chapter describes and evaluates the current ornithological nature conservation interests in relation to the proposed Kirkton Energy Park (hereafter referred to as the "proposed development") which is defined by the area encompassed by the redline boundary ("the proposed development site"). Mention is also made of the wider area surrounding the proposed development site, since bird populations are mobile and there is potential for impacts on bird populations which are outwith the proposed development site ("the study area". 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 bird species above a certain conservation value have been assessed.
- 9.2 Planning policies, legislation, and guidance of relevance to this assessment are provided in **Technical Appendix 4.1: Legislation, Planning Policy and Guidance**.

CONSULTATION

9.3 Consultation has been undertaken with the Energy Consents Unit (ECU) and The Highland Council (THC) through the Environmental Impact Assessment (EIA) Scoping process, and earlier consultation ahead of survey works was undertaken with NatureScot and the Royal Society for the Protection of Birds (RSPB). The consultation responses are summarised in **Table 9-1**. This table also includes details of correspondence with specific consultees post-scoping.

Consultee	Responses Relevant to Avian Ecology	Comment
The Highland Council (THC) – Scoping – 25/05/2021	The EIA Report should provide a baseline survey of the bird and animals (mammals, reptiles, amphibians, etc.) interest on site. It needs to be categorically established which species are present on the proposed development site, and where, before a future application is submitted.	Baseline survey information has been presented as Technical Appendices to the EIA Report (TA 9.1: Ornithological Survey Report 2019 – 2021 and TA 9.2: Confidential Appendix).
	The presence of protected species such as Schedule 1 Birds or European Protected Species must be included and considered as part of the application process, not as an issue which can be considered at a later stage. Any consent given without due consideration to these species may breach European Directives with the possibility of consequential delays or the project being halted by the EC. Please refer to the comments of NatureScot and RSPB in this respect.	Baseline survey information has been presented as Technical Appendices to the EIA Report (TA 9.1: Ornithological Survey Report 2019 – 2021 and TA 9.2: Confidential Appendix). Potential impacts of the proposed development on species and habitats has been addressed within Chapter 8: Ecology, and Chapter 9: Ornithology of the EIA Report.
	The EIA Report should address the likely impacts on the nature conservation interests of all the	Baseline survey information has been presented as Technical Appendices to

Table 9-1: Consultee Responses Relating to Avian Ecology



	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. NatureScot can also provide specific advice in respect of the designated site boundaries for SACs and SPAs and on protected species and habitats within those sites. The potential impact of the development proposals on other designated areas such as SSSIs should be carefully and thoroughly considered and, where possible, appropriate mitigation measures outlined in the EIA Report. NatureScot provide advice on the impact on designated sites.	the EIA Report (TA 9.1: Ornithological Survey Report 2019 – 2021 and TA 9.2: Confidential Appendix). Potential impacts of the proposed development on species and habitats have been addressed within Chapter 8: Ecology, and Chapter 9: Ornithology of the EIA Report.
THC – Scoping Addendum – 03/08/2021	Further to receipt of the attached, thank you for re-consulting THC on the scope of the forthcoming EIA Report for the above proposal. Following a review of the EIA Scoping Addendum, the Planning Authority does not wish to bring any additional matters to the prospective applicant's attention and are satisfied that matters to be assessed remain as per our previous 25 May 2021 response.	Noted.
NatureScot – Scoping – 13/05/2021	This proposal has the potential to adversely affect a number of nationally important natural heritage interests. If adverse impacts on these national interests cannot be mitigated then we may object to the proposal. Our detailed advice is provided in Annex 1 of this letter. In addition to our detailed advice given in Annex 1 of this letter, the applicant should refer to our 'general scoping and pre-application advice' note.	Noted. The 'general scoping and pre- application advice' note has been considered.
	Overall we are content with the scope of the ornithological surveys which we confirmed with the applicant through the Highland Council major pre-application consultation. However, following our pre-application advice, the applicant should be made aware that the Reporters for the Limekiln Extension and Drum Hollistan 2 appeals have requested written submissions from NatureScot and RSPB in relation to the common scoter feature of the Caithness and Sutherland Peatlands SPA.	Baseline survey information is presented as Technical Appendices to the EIA Report (TA 9.1: Ornithological Survey Report 2019 – 2021 and TA 9.2: Confidential Appendix). Potential impacts of the proposed development on species and habitats have been addressed within Chapter 8: Ecology, and Chapter 9: Ornithology of the EIA Report.
	Given the location of this proposal (between the coast and scoter breeding lochs) we therefore advise that common scoter should be included as a target species during the waterbody / diver surveys for this year in order to identify any	Collision risk modelling has been carried out and is detailed within this chapter, with the risks to individual species detailed within the respective species sections inside the

	breeding lochs. In addition to this a robust desk study should also be undertaken for this species and potential impacts in relation to disturbance / displacement and collision risk should be assessed. It is unlikely that the vantage point surveys will pick up flights of scoters as this species usually fly at night, however we advise that an assessment should be made of the likely flight routes of scoters from the coast to their breeding sites and vice versa.	Assessment of Operational Phase Impacts section. Approach to common scoter is detailed further in Technical Appendix 9.3: Common Scoter Assessment .
NatureScot – Post Scoping Email correspondence – 15/06/2021	I have spoken with our ornithology adviser and he has confirmed that we wouldn't require the surveys which the RSPB are asking for. In addition to the inclusion of scoters with the diver surveys, we are satisfied that a topographic review of the land forms coupled with modelling the energetics of scoter making these flights will be sufficient.	Approach to common scoter is detailed in Technical Appendix 9.3: Common Scoter Assessment .
NatureScot – Scoping Addendum – 19/07/2021	Overall we are satisfied with the proposals within the Addendum with regards to landscape, peat, ornithology and protected species. We do however encourage the applicant to get in touch with us at their earliest convenience to discuss the scope of the wild land assessment. We have no additional advice to offer at this stage.	Noted with respect to ornithological interests.
Royal Society for the Protection of Birds (RSPB) – Scoping – 11/05/2021	The proposed development site overlaps the Caithness and Sutherland Peatlands Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar site, and the West Halladale Site of Special Scientific Interest (SSSI). A number of the qualifying species of these sites are likely to be affected by the proposal due to their use of the proposed site and surrounding area. There are also other species that are red or amber listed Birds of Conservation Concern, including white-tailed eagle, curlew, lapwing and snipe which are present in the area and could be affected by the development. No figure is provided to show the proposed infrastructure in relation to the designated sites, but nearest turbine would be within 100m of the boundary of the protected areas. The development would clearly be within connectivity distance of the Caithness and Sutherland Peatlands SPA qualifying species as	The design of the proposed development has been the subject of an extensive design process which has ensured that all of the proposed project infrastructure is now outwith the Caithness and Sutherland Peatlands SPA / SAC / Ramsar site, and West Halladale SSSI. Baseline survey information are presented as Technical Appendices to the EIA Report (TA 9.1: Ornithological Survey Report 2019 – 2021 and TA 9.2: Confidential Appendix). Potential impacts of the proposed development on qualifying species and habitats of the surrounding environmental designated sites are addressed within Chapter 8: Ecology, and Chapter 9: Ornithology of the EIA Report. This includes a detailed

the proposal could lie within the regular commuting or foraging distance of these species. For example, breeding golden plover are known to commute from the bog to feed in the strath during the breeding season. From the information available at this stage, it appears that there would be likely significant effects on the qualifying interests of the Caithness and Sutherland Peatlands SPA and SAC from the proposed windfarm alone or in combination with other projects. Therefore, the EIA Report must include sufficient information to inform an Appropriate Assessment, as required by the Conservation of Habitats and Species Regulations 2017.	review and assessment of impacts on qualifying features of the SPA which are presented in a Technical Appendix (TA 9.4: Shadow Habitats Regulations Assessment) as a shadow HRA designed to inform the Appropriate Assessment.
Figure 11 shows the proposed layout in relation to three vantage points (VPs) used and viewsheds. We note VP2 is located within the turbine array. NatureScot guidance states that VPs are best located outside the survey area to minimise the observer's effect on bird behaviour. Where VPs are located within the survey area, they should not be used simultaneously with other VP locations which overlook them as the presence of an observer either sitting at or moving to / from the VP will probably affect bird behaviour. Therefore, the choice of location of VP2 should be fully justified within the EIA Report and any limitations of the surveys highlighted. Figure 12 shows the locations of the diver VPs but not the viewsheds, so it is not clear which lochs have been covered. These viewsheds should be provided in the EIA Report, along with a map of the survey area, including the lochs that were surveyed.	 Baseline survey information are presented as Technical Appendices to the EIA Report (TA 9.1: Ornithological Survey Report 2019 – 2021 and TA 9.2: Confidential Appendix). Potential impacts of the proposed development on species and habitats are addressed within Chapter 8: Ecology, and Chapter 9: Ornithology of the EIA Report. The selection of VP2 is justified in section 3.2.1 of TA 9.1: Ornithological Survey Report 2019 – 2021. It should be noted however that the location of VP2 is overlooked from VP1 which allows for data collection in this part of the proposed development site to be supported both from VP2, but also from VP1 which would be unaffected by the presence of an observer. It is also worth recognising that the turbine layout has evolved in the period since the scoping response was received and this resulted in the removal of the eastern turbines from the final design for the scheme, meaning that VP2 is no longer within the turbine array. Further detail of the diver surveys is given at section 3.2.2 of TA 9.1: Ornithological Survey Report 2019 - 2021.



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Common scoters are not noted as 'being at risk from wind farms' in Table 8-3: NBN Species Records (past 15 years). We disagree and have concerns regarding the potential impacts on common scoter, particularly the potential of collision with turbines during the hours of darkness when scoter migrate to breeding lochs on the SPA surrounding the proposed development site boundary. Wildfowl often migrate at night and therefore the Vantage Point surveys undertaken to date are unlikely to have recorded them, which may result in unreliable collision risk assessments. There is very little understanding about movements of, and routes used by, the Flows scoter population. Scoter are known to feed at sea during the breeding season and it is possible that birds breeding in the Caithness and Sutherland Peatlands SPA could commute through the proposal site, increasing the likelihood of collision risk. Therefore, it would be useful to obtain scoter records from across the Flow Country from RSPB Scotland and NatureScot and include the species in surveys of lochs within 2km. We would also strongly recommend undertaking nocturnal surveys where possible, using vertical radar coupled with acoustic recorders, remote camera and surveyor observations during the breeding and migration seasons. This would allow a more accurate assessment of the collision risk and barrier effects on birds breeding in the Caithness and Sutherland Peatlands SPA. We understand there are likely to be high cost implications of this and recommend that other developers of wind farms across the Flow Country are contacted to collaborate as this issue has been raised a number of times in RSPB Scotland responses for proposals in the area.	The approach to assessing potential impacts on common scoter was agreed with NatureScot (post-scoping consultation) and is presented as Technical Appendix 9.3: Common Scoter Assessment. Data on scoter records has been received from NatureScot and RSPB and is presented in Technical Appendix 9.3: Common Scoter Assessment. Baseline survey information is presented as Technical Appendices to the EIA Report (TA 9.1: Ornithological Survey Report 2019 – 2021 and TA 9.2: Confidential Appendix). Potential impacts of the proposed development on species and habitats are addressed within Chapter 8: Ecology , and Chapter 9: Ornithology of this EIA Report.
Disturbance, displacement, loss of suitable	Baseline survey information has been
habitat (breeding, wintering and foraging) and	presented as Technical Appendices to
collision risk should be assessed for all scoped in	the EIA Report (TA 9.1: Ornithological
species. This should not only include impacts	Survey Report 2019 – 2021 and TA
from the wind turbines but also new tracks and	9.2: Confidential Appendix).
infrastructure as well as any existing road	Potential impacts of the proposed
widening or upgrades.	development on species and habitats
This proposed development is located between	is addressed within Chapter 8:
the Caithness and Sutherland Peatlands SPA and	Ecology, and Chapter 9: Ornithology
the sea. It is known that red-throated and black-	of this EIA Report

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	throated divers commute from breeding lochs on the SPA northwards to the sea to feed and the proposal could create a barrier for these species. This potential barrier impact should be addressed in the assessment for the proposed windfarm alone, and as part of the cumulative assessment.	Impacts on qualifying species of the adjacent designated sites are fully addressed within this EIA Report. Additional diver surveys were carried out to address the issue of commuting divers and the results of these are presented to allow an assessment of impacts on the wider population of divers to be undertaken. Cumulative aspects are considered although this could be constrained by information available from other sites.
	A robust cumulative assessment of collision risk, disturbance, displacement and barrier effects should take account of all operational, consented and proposed wind energy schemes that could impact on bird populations of both the relevant NHZ (5: The Peatlands of Caithness and Sutherland) and the Caithness and Sutherland Peatlands SPA. The in-combination effect of other relevant plans or projects, such as the Sutherland spaceport and overhead line grid connections at Limekiln, Strathy Wood and Creag Riabhach, should also be considered.	Baseline survey information is presented as Technical Appendices to the EIA Report (TA 9.1: Ornithological Survey Report 2019 – 2021 and TA 9.2: Confidential Appendix). Potential impacts of the proposed development on species and habitats are addressed within Chapter 8: Ecology, and Chapter 9: Ornithology of the EIA Report includes a cumulative assessment of collision risk (paragraphs 9.295 – 9.332 refers). Cumulative assessment will take account of the projects identified. Where possible a quantitative assessment will be undertaken; this is likely to be particularly for collision risk. Qualitative assessments will be used for other potential effects.
	Figure 4 is missing Camster II (at appeal) and we note that Bettyhill Extension is currently at scoping stage.	Noted. Camster II and Bettyhill Extension will be included in the cumulative assessment.
RSPB – Scoping Addendum – 15/07/2021	We note that no specific surveys will be undertaken for common scoter but that they are included as a target species in the Applicant's general bird surveys in the event they are observed. We strongly suggest that specific surveys are undertaken for common scoters as they are known for their elusive and often unpredictable behaviour. Timing of survey visits is critical and specific methodology for common scoter should be used (a minimum of three surveys between 23rd April and 3rd June would	We have discussed the approach to common scoter with NatureScot and agreed a way which would address concerns regarding this species. Given the location of the proposed development site, and the absence of any evidence of scoter during any of the bird surveys, we do not consider that specific surveys were required. Water bodies in proximity to the

be needed to confirm presence and numbers,
with further visits in July and August to assess
productivity).

RSPB Scotland would be happy to provide further information on this. However, since scoters are particularly elusive species, we would also recommend additional monitoring using remote cameras and acoustic recording devices to help appraise any potential impacts.

Flight routes: potential collision and barrier effects

We are pleased that a desk study review and modelling will be undertaken for common scoter in order to assess potential collision or barrier impacts from the development. However, since there is currently no knowledge of migration or local movements of the species or of the possible collision or barrier impacts on these breeding birds in the Flow Country, we are concerned that focusing primarily on topography would not give an accurate picture. Additional factors could affect the flight routes, such as location of preferred feeding areas, other windfarm developments, weather conditions and artificial lighting. There is also no evidence, that we are aware of, to suggest that scoter would take the shortest route to the sea or their breeding lochs.

We are of the opinion that there is a need for realistic scale of investment in strategic monitoring and research. Collaboration with other developers and organisations is needed to tackle this lack of data. The potential cumulative impact on common scoter across the Flows needs to be understood before decisions can be made on individual windfarm proposals. We believe a strategic Flow Country common scoter research programme is required, the results of which can be used to inform the design and assessment of future proposals. We would be happy to offer advice in regard to this but suggest that NatureScot should play a key role. proposed development site were visited regularly as part of other surveys and no scoter were observed. There was no record of scoter on any survey. While scoter can be elusive, if there was any connectivity with the proposed development we would expect there to be some evidence of their presence. That evidence was entirely lacking.

We note that RSPB considers there to be a lack of data, despite the fact they acknowledge there is no evidence of migration or local movements of the species. We consider that there needs to be some kind of indication that there is a potential effect to allow a direction of investigation to be established. As such, we consider a desktop review is commensurate to start to identify if there is an actual issue for this species with this particular proposed development.

Wider issues regarding common scoter are outside the scope of this application.



METHODOLOGY

Field Survey

9.4 A detailed description of survey methods is provided in **Technical Appendix 9.1**. **Table 9-2** provides an overview of the surveys carried out. Data is presented in this EIA Report for the surveys carried out in the period of September 2019 – August 2021.

Survey	Non-Breeding Season 2019 / 2020	Breeding Season 2020	Non-Breeding Season 2020 / 2021	Breeding Season 2021
Vantage Point (VP) Surveys (3 VPs, an average of 6 hours per month per VP)	х	х	Х	х
Additional Vantage Point (VP) Surveys (2 VPs, an average of 12 hours per month, per VP) *		х		х
Breeding Bird Surveys (using amended Brown & Shepherd methodology (Brown & Shepherd, 1993))		Х		Х
Breeding Raptor Surveys		х		х

Table 9-2: Summary of Ornithology Field Surveys

* undertaken at dawn, diurnal, and dusk to monitor red-throated diver *Gavia stellata* and black-throated diver *Gavia arctica*.

Collision Risk Modelling

- 9.5 Collision Risk Modelling (CRM) was carried out for the following species that showed sufficient levels of flight activity over the proposed development site during the survey period:
 - Greylag goose Anser anser;
 - Pink-footed goose Anser brachyrhynchus;
 - Curlew *Numenius arquata*;
 - Lapwing Vanellus vanellus;



- Golden eagle Aquila chrysaetos;
- Whooper swan *Cygnus cygnus*;
- Golden plover *Pluvialis apricaria*;
- Dunlin *Calidris alpina*; and
- Hen harrier *Circus cyaneus*.
- 9.6 A model (Forsythe *et al.*, 1995) was used to calculate the daytime length as a function of latitude (58° 30' 32" N for the centre of the proposed development site) and date (2021). **Table 9-3** presents the turbine parameters used for the CRM.

Turbine Parameter	Value
Number of Turbines	11
Blades per Turbine	3
Hub Height (m)	83.4
Rotor Radius (m)	66.5
Maximum Chord (m)	3.7
	15
Pitch (degrees)	15
Rotation Period (seconds)	4
	۲
Proportion Operational	0.85

Table 9-3: Turbine Parameters

- 9.7 The general methodology used to predict collision risk for birds using the wind farm airspace is provided by NatureScot (SNH, 2000).
- 9.8 The random CRM was used for all species as they exhibit more random flight patterns as opposed to regular linear flight paths.
- 9.9 In summary, the following steps were followed for random bird movements in this assessment:
 - Digitise all flight lines and record relevant characteristics (including species, number of birds, start time of flight and time within each height band) in a database;
 - Review the flight line data, which in this instance indicated that a random collision analysis should be conducted for each species;



- Identify all flights for each species that are at any point within the "at risk" height band and sum the total "at risk" flight duration for each VP, multiplying any flight at risk time by the number of birds observed, where more than one bird is recorded per flight line;
- Calculate an "occupancy rate" for each VP, defined as the observed "at risk" activity levels divided by total observation time and area observed, giving the occupancy per unit time 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 proposed 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 avoidance action; and
- Multiply the number of transits by the collision rate, avoidance factor and operating parameters of the proposed wind farm to estimate the theoretical number of collisions per year.
- 9.10 Avoidance rates used were in accordance with current NatureScot guidance on default values (SNH, 2017a).
- 9.11 The predicted mortality through collision is dependent on a number of variables, including flight activity within the turbine envelope, the species' physiology, nocturnal flight behaviour and flight velocity, weather conditions, the predicted avoidance rate, the number, rotational speed and dimensions of the turbines, and the proportion of the time that the turbines are operational throughout the year.
- 9.12 The following assumptions were made for the species included for CRM:
 - A daylight calculator was used to produce figures for the total daylight period at the proposed development site;
 - Biometric data (bird length and wingspan) for the various species was obtained from the BTO webpage; and
 - Flight speed data taken from Alerstam et al. (2007).

Assessment Methods

9.13 The Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018) (henceforth referred to as the CIEEM guidelines) form the basis of the impact assessment presented in this chapter. These guidelines set out a process of identifying the value of each ornithological receptor and then



characterising the *"impacts"* that are predicted, before discussing the *"effects"* on the integrity or conservation status of the receptor, proposed mitigation and residual effects.

- 9.14 In the interests of clarity and relevance, detailed assessment of potential impacts is focussed on particular ornithological receptors of sufficient value that impacts upon them may be significant in terms of either legislation or policy and which are vulnerable to significant effects arising from the proposed development.
- 9.15 All designated nature conservation sites, bird species and communities that occur within the *"zone of impact"* of the proposed development are defined as potential ornithological features.

Determining Value

- 9.16 The CIEEM guidelines recommend that the value of ornithological features is determined based on a geographic frame of reference. For this proposed development, the following geographic frame of reference is used:
 - International (nature conservation designation, habitat or populations of species of international importance, e.g. a Special Protection Area (SPA) or significant numbers of a designated population outside the designated site);
 - National (nature conservation designation, habitat or populations of species of Scottish importance, e.g. a Site of Special Scientific Interest (SSSI) or a National Nature Reserve (NNR), a nationally important population / assemblage of a species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (WCA) or Annex I of Directive 209/147/EC on the conservation of wild birds (the Birds Directive);
 - Regional (a regionally (i.e. within Natural Heritage Zone (NHZ) 5 The Peatlands of Caithness and Sutherland) important population of birds which have a high conservation value (e.g. Schedule 1, Annex 1, Scottish Biodiversity List (SBL) or Birds of Conservation Concern (BoCC) amber or red species);
 - County (i.e. Caithness) (a population of high conservation birds which represent an important part of the county population of that species);
 - Local (i.e. within 5km) (a population of any species which is important at the local level); and
 - Less than local (a population of birds which has little or no intrinsic nature conservation value).

Valuing Species

9.17 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 I:** Annex I 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;
- UK Birds of Conservation Concern (BoCC): A national classification that categorises breeding bird populations in the UK using a traffic light system to indicate an increasing level of conservation concern. Species are assessed against objective criteria such as population and distribution trends; those that have a declining range and / or population, or that are vulnerable to population effects due to their small population size are categorised as Red or Amber listed species, depending on the extent of the decline or vulnerability;
- **Scottish Biodiversity List (SBL):** Species which are identified as being important from a conservation viewpoint within a Scottish context are listed on the SBL; and
- Local Biodiversity Action Plan (LBAP): Operates at a local authority level and identifies priority habitats and species for which conservation / enhancement measures are underway or planned.

Predicting and Characterising Impacts

- 9.18 In accordance with the CIEEM guidelines, when describing impacts, reference is made to the following, where appropriate:
 - Confidence in predictions the level of certainty than an impact will occur as predicted, based on professional judgement and, where possible, evidence from other schemes this is based on a four point scale: certain / near certain; probable; unlikely; and extremely unlikely;
 - Magnitude the size of an impact in quantitative terms where possible;
 - Extent the area over which an impact occurs;
 - Duration the time for which an impact is expected to last;
 - Reversibility a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible; and
 - Timing and frequency i.e. whether impacts occur during critical life stages or seasons.



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

Significance Criteria

- 9.20 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.
- 9.21 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.
- 9.22 Any significant effects remaining after mitigation (the residual effects), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development control when determining the planning application.

Mitigation, Compensation and Enhancement

- 9.23 It is important as part of any EIA, wherever possible, to clearly differentiate between mitigation, compensation and enhancement and these terms are defined here as follows:
 - Mitigation is used to refer to measures to avoid, reduce or remedy a specific negative impact *in situ*. Mitigation is only required for negative impacts assessed as being significant or where required to ensure compliance with legislation.
 - Compensation is used to refer to measures proposed in relation to specific negative impacts but where it is not possible to fully mitigate for negative impacts *in situ*. Compensation is only required for negative impacts assessed as being significant or where required to ensure compliance with legislation.
 - Enhancement is used to refer to measures that will result in positive ornithological impacts but which do not relate to either specific significant negative impacts or where measures are required to ensure legal compliance.



Assessment Areas

9.24 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.

BASELINE RESULTS

9.25 The results of each ornithological survey are presented within **Technical Appendices 9.1: Ornithological Surveys 2019 – 2021** and **9.2: Confidential Appendix**. This section provides an assessment of the ornithological receptors found on the proposed development site and within the study area, and assesses their value in the context of the proposed development.

Designated Sites

- 9.26 As described in Section 4.1.1 of **Technical Appendix 9.1** and shown on **Figure 9.1**, nine designated sites with avian qualifying features were identified within 10km of the proposed development site (increased to 20km for Natura 2000 sites with qualifying interests for geese) (**Table 9-4** refers).
- 9.27 The boundary of the proposed development does slightly overlap the Caithness and Sutherland Peatlands SPA and RAMSAR Sites, and the West Halladale SSSI in the north west of the proposed development site. This is to incorporate the entirety of the of the forestry block there as this area will be the subject of peatland restoration proposals as part of a Habitat Management Plan (Technical Appendix 8.5: Draft Habitat Management Plan refers).

Site name	Designation	Distance from site boundary	Qualifying features	Conservation value
Caithness and Sutherland Peatlands	SPA	Immediately adjacent to the west of the proposed development and slightly overlapping	 Under Article 4.1 – Breeding: black-throated diver, 26 pairs representing at least 16.3% of the breeding population in Great Britain (11 year mean, 1986 – 1996) golden eagle, 5 pairs representing at least 1.3% of the breeding population in Great Britain (Count, as at 1992) golden plover, 1,064 pairs representing at least 4.7% of the breeding population in Great Britain (Count, as at mid-1990s) hen harrier, 14 pairs representing at least 2.8% of the breeding population in Great Britain (5 year mean, 1993 – 1997) merlin <i>Falco columbarius</i>, 54 pairs representing at least 4.2% of the breeding 	International

Table 9-4: Designated Sites within 10km of the proposed development site



			 population in Great Britain (Count, as at early 1990s) red-throated diver, 89 pairs representing at least 9.5% of the breeding population in Great Britain (Two year mean, 1993 – 1994) short-eared owl Asio flammeus, 30 pairs representing at least 3.0% of the breeding population in Great Britain (Count, as at mid-1990s) wood sandpiper Tringa glareola, 5 pairs representing up to 50.0% of the breeding population in Great Britain (Two year mean, 1994 – 1995) Under Article 4.2 – Breeding: common scoter Melanitta nigra, 27 pairs representing <0.1% of the breeding Western Siberia / Western and Northern Europe / North-western Africa population (1996) dunlin, 1,860 pairs representing at least 16.9% of the breeding Baltic / UK / Ireland population (Count, as at 1994) greenshank Tringa nebularia, 256 pairs representing at least 0.4% of the breeding Europe / Western Africa population (1994 / 95) wigeon Anas penelope, 43 pairs representing <0.1% of the breeding Europe / North-western / Northwestern [Vorthwestern / Northeastern Europe population (1994) 	
North Caithness Cliffs	SPA	c. 4.4km north at its closest point	 Under Article 4.1 – peregrine Falco peregrinus, 6 pairs (0.5% of GB population) (figure from SPA citation, 2018b) Under Article 4.2 – common guillemot Uria aalge, 38,300 individuals (1% of the North Atlantic biogeographic population and 4% of GB population (1985 – 1987) fulmar Fulmarus glacialis, 14,700 pairs (3% of GB population) (1985 – 1987) black-legged kittiwake Rissa tridactyla, 13,100 pairs (3% of GB population) (1985 – 1987) 	International



			 razorbill <i>Alca torda</i>, 4,000 individuals (3% of GB population) (1985 – 1987) puffin <i>Fratercula arctica</i>, 2,080 pairs (0.4% of GB population and greater than 2,000 individuals) (1985 – 1987) Seabird assemblage, 110,000 individuals (1985 – 1987) 	
Caithness Lochs	SPA	c. 14.89km east at its closest point	 Under Article 4.1 – Greenland white-fronted goose Anser albifrons flavirostris, winter peak mean of 440 (3% of GB population, 1% of Greenlandic population) (1993 / 1994 – 1997 / 1998) whooper swan, winter peak mean of 240 (4% of GB population, 1% of Icelandic population) (1993 / 1994 – 1997 / 1998) Under Article 4.2 – greylag goose, winter peak mean of 7,190 (7% of GB and Icelandic populations) (1993 / 1994 – 1997 / 1998) 	International
Caithness and Sutherland Peatlands	Ramsar	Immediately adjacent to the west of the proposed development and slightly overlapping	 Breeding waterfowl including internationally important populations of – greylag goose Under Ramsar criterion 2 – nationally important breeding populations of ten waterfowl species Under Ramsar criterion 6 – Breeding: dunlin <i>schinzii</i> sub-species, 1,860 pairs representing an average of 7.4% of the breeding population (Count, as at mid-1990s) 	International
West Halladale	SSSI	Immediately adjacent to the west of the proposed development and slightly overlapping	 breeding bird assemblage black-throated diver common scoter 	National



East Halladale	SSSI	c. 1.50km east at its closest point	 breeding bird assemblage dunlin, breeding golden plover, breeding 	National
Red Point Coast	SSSI	c. 4.55km north at its closest point	• guillemot	National
Lochan Buidhe Mires	SSSI	c. 6.37km west at its closest point	 breeding bird assemblage 	National
Forsinard Flows	NNR	c. 6.95km south south east at its closest point	 dunlin golden plover greenshank red-throated diver black-throated diver common scoter hen harrier 	National

Species

Greylag Goose

- 9.28 Greylag goose (in the Outer Hebrides, Caithness, Sutherland and Wester Ross only) are listed on Schedule 1 (Part II) of the WCA. Birds are afforded special protection during the close season (1 February to 31 August (21 February to 31 August below high water mark)) but which may be killed or taken outside this period. They are amber-listed on BoCC and are considered to be at risk from wind farms (SNH, 2006 and 2018a). No NHZ population estimate exists; however a survey carried out in 2008/09 of Scottish greylag goose populations suggested that the north west Scotland breeding population was 34,500 (Mitchell *et al.*, 2011). This does not take account of the Icelandic population which also winter in Scotland.
- 9.29 **Table 9-5** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Greylag Goose	Sep 2019 – Feb 2020	6	23	3	2,755	2,635
	March 2020 – August 2020	2	110	13	40,726	40,246
	September 2020 –	2	17	3	1,931	587

Table 9-5: Results of VP Surveys for Greylag Goose



Februar 2021	γ				
March 2 August	2021 – 1 2021	16	28	4,341	1,349

- 9.30 Breeding populations of greylag goose are a qualifying feature of the Caithness and Sutherland Peatlands Ramsar. Wintering non-breeding populations are qualifying features of the Caithness Lochs SPA although these are more likely to be migratory birds from Iceland than the breeding population of the SPA, but there could be crossover between the two breeding populations in the winter. The breeding population of greylag goose forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI, East Halladale SSSI, and Lochan Buidhe Mires SSSI.
- 9.31 No greylag goose were confirmed as breeding on site in 2020 or 2021, with a possible pair being recorded on Lochan Coulbackie (in the survey buffer) in 2020 (**Figures 9.3** and **9.4** refer).
- 9.32 Given the relatively large number of flights recorded in each of the breeding seasons, it can be assumed that the birds observed form part of the breeding population of the Ramsar designated site.
- 9.33 Greylag goose are considered to have an intrinsic value of national, given the recorded activity and the proximity of the Ramsar site. There was some use of the proposed development site observed, but the relatively limited numbers observed suggests that the proposed development site is not used regularly for foraging but is flown over by birds ranging across the study area. Therefore, the proposed development site is considered to be of local importance for the species as a result of the relatively limited use.

Pink-Footed Goose

- 9.34 Pink-footed goose are amber-listed on BoCC and are considered to be at risk from wind farms (SNH, 2018a). The NHZ peak count of wintering pink-footed goose is estimated at 2,070 (Wilson, 2015). There are no large roosts known within 20km of the proposed development (Mitchell 2012).
- 9.35 All records of pink-footed goose relate to birds flying over the proposed development and there was no usage of the proposed development site itself. All flights were at risk height or above.
- 9.36 During the 2020-2021 non-breeding season only one flight was recorded, whilst nine flights were recorded during the 2021 breeding season. No birds were observed feeding on or close to the proposed development.
- 9.37 **Table 9-6** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.



Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Pink-footed Goose	September 2019 – February 2020	-	-	-	-	-
	March 2020 – August 2020	-	-	-	-	-
	September 2020 – February 2021	26	26	1	1,196	0
	March 2021 – August 2021	18	150	9	30,760	1,428

Table 9-6: Results of VP Surveys for Pink-footed Goose

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

Curlew

- 9.39 Curlew are an SBL species, red-listed on BoCC, and are considered to be at risk from wind farms (SNH, 2018a). Declines of up to 40% have been recorded in breeding populations within about 650m of wind farms (Pearce-Higgins, 2012).
- 9.40 The breeding population of curlew forms part of the breeding bird assemblage which is one of the qualifying features of Lochan Buidhe Mires SSSI (located approximately 6.3km to the west of the proposed development site at its closest point). The NHZ population is estimated at 1,737 pairs (Wilson, 2015), although this species is undergoing a decline in population across the UK.
- 9.41 **Table 9-7** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.



Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Curlew	September 2019 – February 2020					
	March 2020 – August 2020	1	2	31	983	507
	September 2020 – February 2021					
	March 2021 – August 2021	1	2	39	909	475

Table 9-7: Results of VP Surveys for Curlew

- 9.42 No confirmed territories were identified within the proposed development, with one possible territory in the survey buffer to the north east in 2020, and one probable territory to the west of turbine 4 and one possible territory in the survey buffer to the north in 2021 (**Figures 9.3** and **9.4** refer).
- 9.43 The number of birds recorded and potentially breeding is relatively small given the NHZ population estimate and the widespread occurrence of this species across the county. As such, the importance of the proposed development site to curlew is assessed as local.

Lapwing

9.44 Lapwing are an SBL species, red-listed on BoCC, and are considered to be at risk from wind farms (SNH, 2006 and 2018a). **Table 9-8** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Lapwing	September 2019 – February 2020					
	March 2020 – August 2020	1	5	5	121	80

Table 9-8: Results of VP Surveys for Lapwing



September 2020 – February 2021					
March 2021 – August 2021	1	6	11	597	593

- 9.45 No confirmed territories were identified within the proposed development site, with one possible territory in the survey buffer to the north east in 2020 and no territories in 2021 (**Figures 9.3** and **9.4** refer).
- 9.46 The Scottish population of breeding lapwing is estimated at 71,500 105,600 (Forrester, 2007), although is likely to have declined since that estimate was made. Lapwing is widely distributed across Caithness and Sutherland.
- 9.47 The number of identified territories within the proposed development site is relatively low when compared with the regional and county populations. The movement of birds across the proposed development site increases the population size which could potentially be affected by the proposed development so the conservation value of the proposed development site is assigned as local.

Golden Eagle

- 9.48 Golden eagle are an Annex 1 / Schedule 1 / SBL species, are green-listed on BoCC, and are considered to be at risk from wind farms (SNH, 2018a). The level of legal protection for golden eagle is due to historic and current levels of persecution and because of the relatively small national population.
- 9.49 The breeding population of golden eagle is one of the qualifying features of the Caithness and Sutherland Peatlands SPA. The NHZ population is estimated at 18 occupied breeding territories (Wilson, 2015), while the SPA population is currently estimated at 5 pairs (SNH, 2017c). While this species was not recorded as breeding within the proposed development site, there was a small level of flight activity recorded during VP surveys together with observations recorded during the breeding raptor surveys in the study area.
- 9.50 The breeding population of golden eagle forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (the majority of which is adjacent to the west of the proposed development), East Halladale SSSI (located approximately 1.50km east of the proposed development site at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).
- 9.51 **Table 9-9** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.



Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Golden Eagle	September 2019 – February 2020	1	1	4	960	485
	March 2020 – August 2020					
	September 2020 – February 2021					
	March 2021 – August 2021					

Table 9-9: Results of VP Surveys for Golden Eagle

- 9.52 There was no evidence of golden eagle breeding on the proposed development site. There was some historical evidence of breeding in the study area. Given the proximity of the Caithness and Sutherland Peatlands SPA and West Halladale SSSI, observations are considered to be of birds which form part of the SPA / SSSI populations.
- 9.53 Golden eagle are therefore considered to have an intrinsic value of national, given the activity involved birds that were potentially territory holding. There was some use of the proposed development site observed, but it was limited to very occasional ranging flights. The proposed development site is considered to be of local importance for the species as a result of the relatively limited use.

Whooper Swan

- 9.54 Whooper swan is listed on Schedule 1 of the WCA 1981, and are amber-listed on BoCC. They are also considered to be at risk from wind farms (SNH, 2006 and 2018a). Wintering non-breeding populations are qualifying features of the Caithness Lochs SPA, with a winter peak mean of 240 (SNH, 1999) although it should be noted that WeBS data for the constituent parts of the SPA suggest the recent (i.e. 2015/16 2019/20) 5 year mean has increased to 708 (data taken from Frost *et al* (2021)). The NHZ peak count of wintering whooper swan is estimated at 190 (Wilson, 2015).
- 9.55 All records of whooper swan relate to birds flying over the proposed development and there was no usage of the proposed development site itself. All flights were at risk height or above.
- 9.56 **Table 9-10** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.



Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Whooper Swan	September 2019 – February 2020					
	March 2020 – August 2020	12	12	1	240	240
	September 2020 – February 2021					
	March 2021 – August 2021	8	8	1	216	216

Table 9-10: Results of VP Surveys for Whooper Swan

9.57 There was no use of the proposed development site, but it does occupy a location which swans can fly over – either on migration or as feeding movements from roosts. The numbers involved are not at a level to be considered either nationally or internationally important in their own right. Caithness Lochs SPA is located approximately 15km to the east of the proposed development site, this is beyond the likely ranging distance of this species which is a maximum of 5km (SNH 2016a). Therefore, the birds observed are not considered to form part of the SPA population. As such, given the lack of relationship with the proposed development site, and taking into account the number overflying, the proposed development site would be considered of less than local importance.

Golden Plover

- 9.58 Golden plover are listed on Annex 1 of the EU Birds Directive, are an SBL species and are greenlisted on BoCC. They are considered to be at risk from wind farms (SNH, 2018a).
- 9.59 The breeding population of golden plover is one of the qualifying features of the Caithness and Sutherland Peatlands SPA (the majority of which is adjacent to the west of the proposed development). The SPA population is currently estimated at 1,922 pairs (SNH, 2017c). The NHZ population is estimated at 3,125 breeding pairs (Wilson, 2015).
- 9.60 The breeding population of golden plover forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (the majority of which is adjacent to the west of the proposed development) and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development at its closest point). The breeding population is also one of the qualifying features of the East Halladale SSSI (located approximately 1.50km east of the proposed development at its closest point).
- 9.61 **Table 9-11** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.



Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Golden Plover	September 2019 – February 2020					
	March 2020 – August 2020	1	11	24	515	165
	September 2020 – February 2021					
	March 2021 – August 2021	1	3	43	666	97

Table 9-11: Results of VP Surveys for Golden Plover

- 9.62 No confirmed territories were identified within the proposed development site, with one probable territory in the survey buffer to the west in 2020, and two probable territories (to the west and east of turbine 5) and two possible territories (in the survey buffer to the south west) in 2021 (Figures 9.3 and 9.4 refer). Birds outwith the SPA do not form part of the SPA population.
- 9.63 All flight activity was observed during the two breeding seasons. Given the proximity of the SPA, and the fact that territories were within the SPA, it is considered that at least some birds observed form part of the SPA population; although it should be noted that there were some territories recorded outwith the SPA boundary, but within the proposed development and these pairs would not form part of the SPA population.
- 9.64 Golden plover are considered to have an intrinsic value of international, given the recorded activity and the proximity of the SPA. There was some use of the proposed development site observed, but the relatively limited numbers observed suggests that the proposed development site is not of great importance for the SPA population and is used by birds ranging in the wider area. Therefore, when the numbers of birds observed are assessed against the greater SPA and NHZ populations, the proposed development site is considered to be of local importance for the species.

Dunlin

- 9.65 Dunlin are listed on Annex 1 of the EU Birds Directive, are an SBL species and are red-listed on BoCC. They are considered to be at risk from wind farms (SNH, 2018a).
- 9.66 The breeding population of dunlin is one of the qualifying features of the Caithness and Sutherland Peatlands SPA / Ramsar (located immediately adjacent to the west of the proposed development). The SPA population is currently estimated at 1,366 pairs (SNH, 2017c). The NHZ population is estimated at 2,196 breeding pairs (Wilson, 2015).



- 9.67 The breeding population of dunlin forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (the majority of which is adjacent to the west of the proposed development) and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development at its closest point). The breeding population is also one of the qualifying features of the East Halladale SSSI (located approximately 1.50km east of the proposed development at its closest point).
- 9.68 **Table 9-12** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Dunlin	September 2019 – February 2020					
	March 2020 – August 2020	1	23	4	255	230
	September 2020 – February 2021					
	March 2021 – August 2021	1	1	1	4	0

Table 9-12: Results of VP Surveys for Dunlin

- 9.69 No confirmed territories were identified within the proposed development site, with one probable territory in the survey buffer to the west in 2020, and one probable territory (in the survey buffer to the west) and one possible territory (within the proposed development site, to the east of turbines 5 and 6) in 2021 (**Figures 9.3** and **9.4** refer). Birds breeding outwith the SPA do not form part of the SPA population.
- 9.70 All flight activity was observed during the two breeding seasons. Given the proximity of the SPA, it is considered that some birds observed form part of the SPA population, although territories within the proposed development will not form part of the SPA population.
- 9.71 Dunlin are considered to have an intrinsic value of national, given the recorded activity and the proximity of the SPA. There was some use of the proposed development site observed, but the relatively limited numbers observed suggests that the proposed development site is not of great importance for the SPA population and is used by birds ranging in the wider area. Therefore, when the numbers of birds observed are assessed against the greater SPA and NHZ populations, the proposed development site is considered to be of local importance for the species.



Hen Harrier

- 9.72 Hen harrier are listed on Annex 1 of the EU Birds Directive, and Schedules 1 and 1A of the WCA 1981. This means that not only are they protected from injury or killing, they are protected from disturbance around their nest, their nests and dependent young have special protection from disturbance while they have an active nest, but they are also protected from reckless and / or intentional harassment at all times. They are also an SBL species, are red-listed on BoCC and are considered to be at risk from wind farms (SNH, 2018a).
- 9.73 The breeding population is a qualifying feature of the Caithness and Sutherland Peatlands SPA (located immediately adjacent to the west of the proposed development). The documented SPA population is currently estimated at 18 breeding pairs (SNH, 2017c) while the NHZ population is estimated at 38 breeding pairs (Wilson, 2015).
- 9.74 The breeding population of hen harrier forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (the majority of which is adjacent to the west of the proposed development).
- 9.75 **Table 9-13** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Hen Harrier	September 2019 – February 2020	1	1	1	70	0
	March 2020 – August 2020	1	1	11	1,256	43
	September 2020 – February 2021	1	1	4	867	0
	March 2021 – August 2021	1	1	2	53	33

Table 9-13: Results of VP Surveys for Hen Harrier

- 9.76 There was no evidence of hen harrier breeding on or around the proposed developed site. There was some historical evidence of breeding in the wider area. Given the proximity of the Caithness and Sutherland Peatlands SPA and West and East Halladale SSSIs, observations are considered to be of birds which form part of the SPA / SSSI populations.
- 9.77 Hen harrier are therefore considered to have an intrinsic value of national, given the activity involved birds that were potentially territory holding. There was some use of the proposed development site observed, but was limited to occasional ranging flights. The proposed



development site is considered to be of local importance for the species as a result of the relatively limited use.

Black-throated Diver

- 9.78 Black-throated diver are listed on Annex 1 of the EU Birds Directive, Schedule 1 of the WCA 1981, and are amber-listed on BoCC. They are considered to be at risk from wind farms (SNH, 2018a).
- 9.79 The breeding population of black-throated diver is one of the qualifying features of the Caithness and Sutherland Peatlands SPA (the majority of which is adjacent to the west of the proposed development). The SPA population is currently estimated at 17 breeding pairs (SNH, 2017c) and the NHZ population is estimated at 39 breeding pairs (Wilson, 2015).
- 9.80 The breeding population of black-throated diver is also one of the qualifying features of West Halladale SSSI (the majority of which is adjacent to the west of the proposed development). The breeding population also forms part of the breeding bird assemblage which is one of the qualifying features of East Halladale SSSI (located approximately 1.50km to the east of the proposed development site at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).
- 9.81 Black throated divers either breed on very large lochs, or, when they breed on smaller lochs, will feed on other lochs around the breeding loch, or if close enough, will commute to the sea to feed while breeding. However, during the standard VP surveys, no flights were recorded passing through the turbine array at risk height.
- 9.82 At the start of both breeding seasons, lochs considered suitable for breeding black-throated diver were surveyed. These were all located to the west of the proposed development site and included Loch Sgiathanach, Loch Baligill, Achridigill Loch, Lochan Coulbackie, Loch na Eaglaise Mòr, Loch na h-Eaglaise Beag, Loch nan Clach, Loch nan Gall and Loch Badaidh na Meana and Loch a' Mhuilinn.
- 9.83 During focal diver VP watches in 2020, four flights of black-throated diver were recorded, all at risk height. In 2021, a pair were observed on and around a solitary lochan; the absence of any activity in July or any sightings of juveniles suggests that breeding may not have been successful.
- 9.84 The number of flights recorded is lower than the number of flights recommended by NatureScot to be necessary to identify commonly used diver flight paths. **Table 9-14** presents the total number of flights recorded during focal diver watches conducted in 2020 and 2021, including the total bird flight seconds and at risk bird flight seconds.

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds	Number of Ground Registration s
Black- throated diver	September 2019 –						

Table 9-14: Results of focal diver VP Surveys for Black-throated Diver



February 2020						
March 2020 – August 2020	2	4	4	310	310	1
September 2020 – February 2021						
March 2021 – August 2021	1	2	0	0	0	8

9.85 No confirmed territories were identified within the proposed development site, with one confirmed territory to the west in 2021.

- 9.86 Black-throated diver are considered to have an intrinsic value of national, given the recorded activity and the proximity of the SPA. There was no activity recorded within the proposed development site, reflecting the lack of this species' preferred habitat. Additionally there was no evidence of any flight lines crossing through the proposed development, even with the presence of a possible territory to the west of the proposed development. Movements were recorded over the plateau to the west flying along a north south axis. This makes sense when the topographic situation is examined; the gradients would be more severe for divers crossing the proposed development than flying down across the more gently sloping plateau to the sea.
- 9.87 The lack of any activity over the proposed development would suggest that it is not of great importance for the SPA population, especially for commuting birds. As such, the importance of the proposed development site to black-throated diver is assessed as less than local.

Merlin

- 9.88 Merlin are listed on Annex 1 of the EU Birds Directive and Schedule 1 of the WCA 1981. They are also an SBL species, are red-listed on BoCC, and are considered to be at risk from wind farms (SNH, 2018a).
- 9.89 The breeding population of merlin is one of the qualifying features of the Caithness and Sutherland Peatlands SPA (the majority of which is adjacent to the west of the proposed development). The documented SPA population is currently estimated at 54 breeding pairs (SNH, 2017c) and the NHZ population is estimated at 71 breeding pairs (Wilson, 2015).
- 9.90 The breeding population also forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (the majority of which is adjacent to the west of the proposed development), East Halladale SSSI (located approximately 1.50km to the east of the proposed development site at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).



9.91 **Table 9-15** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Merlin	September 2019 – February 2020					
	March 2020 – August 2020	1	1	4	30	0
	September 2020 – February 2021	1	1	1	12	0
	March 2021 – August 2021	1	1	3	113	0

Table 9-15: Results of VP Surveys for Merlin

- 9.92 There was no evidence of merlin breeding on or around the proposed developed site. There was some historical evidence of breeding in the study area. Given the proximity of the Caithness and Sutherland Peatlands SPA and East Halladale SSSI, observations are considered to be of birds which form part of the SPA / SSSI populations.
- 9.93 Merlin are therefore considered to have an intrinsic value of national, given the activity involved birds that were potentially territory holding. There was some limited use of the proposed development site observed, but was limited to occasional ranging flights. The proposed development site is considered to be of local importance for the species as a result of the relatively limited use.

Red-throated Diver

- 9.94 Red-throated diver are listed on Annex 1 of the EU Birds Directive, Schedule 1 of the WCA 1981, and are green-listed on BoCC. They are considered to be at risk from wind farms (SNH, 2018a).
- 9.95 The breeding population of red-throated diver is one of the qualifying features of the Caithness and Sutherland Peatlands SPA (the majority of which is adjacent to the west of the proposed development). The SPA population is currently estimated at 46 breeding pairs (SNH, 2017c) and the NHZ population is estimated at 58 breeding pairs (Wilson, 2015).
- 9.96 The breeding population also forms part of the breeding bird assemblage which is one of the qualifying features of East Halladale SSSI (located approximately 1.50km to the east of the proposed development site at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).



- 9.97 Red-throated divers tend to breed on small lochans which do not provide enough resources to support breeding attempts. As a result birds usually fly to feed on the sea where the lochan is within commuting distance (typically 15-16km) of the sea. As a result consideration must be given to birds commuting regularly through the proposed development site as well as any which may be breeding on or in the vicinity of it. However, during the standard VP surveys, no flights were recorded passing through the turbine array at risk height.
- 9.98 At the start of both breeding seasons, lochs considered suitable for breeding red-throated diver were surveyed. These were all located to the west of the proposed development site and included Loch Sgiathanach, Loch Baligill, Achridigill Loch, Lochan Coulbackie, Loch na Eaglaise Mòr, Loch na h-Eaglaise Beag, Loch nan Clach, Loch nan Gall and Loch Badaidh na Meana and Loch a' Mhuilinn.
- 9.99 During focal diver VP watches in 2020, eleven flights of red-throated diver were subsequently recorded, all at risk height and all to the west of the proposed development, generally flying along a north/south axis to the west. A pair and juvenile birds were also observed at two lochans to the west of the proposed development site, resulting in a confirmed and possible breeding territory.
- 9.100 In 2021, six flights were recorded, all at risk height but all to the west of the proposed development. A pair were also observed once at a single lochan to the west of the proposed development site, resulting in a possible territory. However, as the observation was relatively early in the season, and in the absence of any other evidence of breeding, it is considered that these were likely prospecting birds that may have eventually bred elsewhere. A second pair were also observed at another lochan towards the end of May. However, as divers are known to move between lochans, and in the absence of any other evidence of breeding, this pair are considered transient.
- 9.101 The number of flights recorded is lower than the number of flights recommended by NatureScot to be necessary to identify commonly used diver flight paths. **Table 9-16** presents the total number of flights recorded during focal diver watches conducted in 2020 and 2021, including the total bird flight seconds and at risk bird flight seconds.

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds	Number of Ground Registration s
Red- throated diver	September 2019 – February 2020						
	March 2020 – August 2020	1	3	11	1,710	1,710	0
	September 2020 – February 2021						
	March 2021 – August 2021	1	2	6	968	968	0

Table 9-16: Results of focal diver VP Surveys for Red-throated Diver



- 9.102 No confirmed territories were identified within the proposed development site, with one confirmed territory and one possible territory in 2020, and two possible territories in 2021, all located to the west of the proposed development site.
- 9.103 Red-throated diver are considered to have an intrinsic value of national, given the recorded activity and the proximity of the SPA. There was no activity recorded within the proposed development site, reflecting the lack of this species' preferred habitat. This would suggest that the proposed development site is not of great importance for the SPA population, especially for commuting birds. As such, the importance of the proposed development site to red-throated diver is assessed as less than local.

Greenshank

- 9.104 Greenshank are listed on Schedule 1 of the WCA 1981 and are amber-listed on BoCC. They are considered to be at risk from wind farms (SNH, 2018a).
- 9.105 The breeding population of greenshank is one of the qualifying features of the Caithness and Sutherland Peatlands SPA (located immediately adjacent to the west of the proposed development). The SPA population is currently estimated at 653 breeding pairs (SNH, 2017c) and the NHZ population is estimated at 421 breeding pairs (Wilson, 2015).
- 9.106 The breeding population also forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (the majority of which is adjacent to the west of the proposed development), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).
- 9.107 **Table 9-17** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Greenshank	September 2019 – February 2020					
	March 2020 – August 2020	1	1	2	62	35
	September 2020 – February 2021					
	March 2021 – August 2021					

Table 9-17: Results of VP Surveys for Greenshank



- 9.108 There was no evidence of greenshank breeding on or around the proposed developed site. Given the proximity of the Caithness and Sutherland Peatlands SPA, observations are considered to be of wide-ranging, transient birds which form part of the SPA population.
- 9.109 Greenshank are considered to have an intrinsic value of national, given the recorded activity and the proximity of the SPA. There was some use of the proposed development site observed, but the very small numbers observed suggests that the proposed development site is not of great importance for the SPA population and is used by birds ranging in the wider area. Therefore, when the numbers of birds observed are assessed against the greater SPA and NHZ populations, the proposed development site is considered to be of local importance for the species.

Peregrine

- 9.110 Peregrine are listed on Annex 1 of the EU Birds Directive and Schedule 1 of the WCA 1981. They are also an SBL species, are green-listed on BoCC, and are considered to be at risk from wind farms (SNH, 2018a).
- 9.111 The breeding population of peregrine is a qualifying feature of the North Caithness Cliffs SPA (located approximately 4.4km north of the proposed development at its closest point). The documented SPA population is estimated at 6 breeding pairs (SNH, 2018b), and the NHZ population is estimated at 15 breeding pairs (Wilson, 2015).
- 9.112 The breeding population of peregrine forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (the majority of which is adjacent to the west of the proposed development), East Halladale SSSI (located approximately 1.50km east of the proposed development site at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).
- 9.113 **Table 9-18** shows the flight activity recorded during the VP surveys divided between the four different survey seasons.

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Peregrine	September 2019 – February 2020					
	March 2020 – August 2020	1	1	1	45	0
	September 2020 – February 2021	1	1	1	75	0

Table 9-18: Results of VP Surveys for Peregrine



March 2021 –	1	1	1	25	25
August 2021					

- 9.114 No peregrine were recorded breeding on the proposed development site in 2020 or 2021, and all records came from VP surveys, with additional activity recorded in the wider area courtesy of breeding raptor surveys. However, there is the possibility that the birds observed form part of the breeding population of the SPA / SSSIs; peregrine are a wide ranging species within their territories.
- 9.115 The current usage of the proposed development site is very limited, suggesting that the proposed development site only forms part of the foraging resource for this species and is only used very intermittently. They are generally a nationally important species, but given the limited use of the proposed development site, the proposed development site is considered to be of less than local importance to this species.

Other

9.116 Table 9-19 provides the VP data for those species recorded during VPs divided between the four different survey seasons, and a summary evaluation is provided in Table 9-20 for all other Annex 1 / Schedule 1 / non-passerine SBL / red-listed species (according to BoCC), plus any species considered to be at risk from wind farms. Snipe *Gallinago gallinago* has also been included as this species has been shown to be negatively affected by wind farms (Pearce-Higgins, 2012).

Species	Survey Season	Min. No. of Birds	Max. No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Barnacle Goose Branta Ieucopsis	September 2019 – February 2020					
	March 2020 – August 2020	4	4	1	200	40
	September 2020 – February 2021					
	March 2021 – August 2021					
Fieldfare Turdus pilaris	September 2019 – February 2020	3	34	2	2,950	1,915

Table 9-19: Results of VP Surveys – Other Species



	March 2020 – August 2020					
	September 2020 – February 2021					
	March 2021 – August 2021					
Snipe	September 2019 – February 2020					
	March 2020 – August 2020	1	2	4	45	0
	September 2020 – February 2021	3	3	1	21	0
	March 2021 – August 2021	1	2	13	112	34
Whimbrel Numenius phaeopus	September 2019 – February 2020					
	March 2020 – August 2020	7	7	1	210	0
	September 2020 – February 2021					
	March 2021 – August 2021	9	9	1	342	342

Table 9-20: Conservation Evaluations – Other Species

Species	Reason for inclusion	Occurrence on proposed development	Evaluation	Justification
Barnacle Goose	Annex 1 / SBL	Very small number of flights recorded during VPs during March – August 2020.	Less than local	Very limited use of the proposed development site.



Cuckoo Cuculus canorus	SBL / Red listed	Recorded as non-breeding during 2020 Breeding Bird Survey.	Less than local	Not considered to be present on the proposed development site as a breeding species.
Fieldfare	Schedule 1 / Red listed	Very small number of flights recorded during VPs during September 2019 – February 2020.	Less than local	Very limited use of the proposed development site.
Greenfinch Carduelis chloris	Red listed	Recorded as non-breeding during 2020 Breeding Bird Survey.	Less than local	Not considered to be present on the proposed development site as a breeding species.
Lesser Redpoll Acanthis cabaret	SBL / Red listed	One possible breeding territory in survey buffer in 2020. Additional observation recorded as non-breeding during 2020 Breeding Bird Survey.	Less than local	Very limited use of the proposed development site.
Linnet Linaria cannabina	SBL / Red listed	One probable breeding territory in survey buffer in 2020. Additional observations recorded as non-breeding during 2020 Breeding Bird Survey.	Less than local	Relatively common and widespread species. Very limited use of the proposed development site.
Mistle Thrush <i>Turdus</i> viscivorus	Red listed	Recorded as non-breeding during 2020 Breeding Bird Survey.	Less than local	Relatively common and widespread species. Not considered to be present on the proposed development site as a breeding species.
Redwing Turdus iliacus	Schedule 1 / SBL	Recorded as non-breeding during 2020 Breeding Bird Survey.	Less than local	Very limited use of the proposed development site.
Skylark Alauda arvensis	SBL / Red listed	13 probable (4 within the proposed development site, 9 within the survey buffer) and 5 possible (1 within the proposed development site, 4	Less than local	Relatively common species with a small on-site breeding population.


		within the survey buffer) breeding territories recorded during 2020 Breeding Bird Survey.		
Snipe	Amber listed / Negatively affected by wind farms	Small number of flights recorded during VP surveys during March – August 2020, September 2020 – February 2021, and March – August 2021. One probable breeding territory recorded in the survey buffer in 2020 during the 2020 Breeding Bird Survey. One probable breeding territory recorded in the survey buffer and one possible breeding territory recorded within the proposed development site in 2021 during the 2021 Breeding Bird Survey.	Less than local	Regional population is estimated at 2,673 (Wilson, 2015). Numbers of birds using the proposed development site are not considered locally significant.
Whimbrel	Schedule 1 / Red listed	Small number of flights recorded during VP surveys during March – August 2020 and March – August 2021.	Less than local	Very limited use of the proposed development site; likely to be birds on migration only.
Whinchat Saxicola rubetra	Red listed	Recorded as non-breeding during 2020 Breeding Bird Survey.	Less than local	Very limited use of the proposed development site.
Yellowhammer Emberiza citrinella	SBL / Red listed	One possible breeding territory recording in the survey buffer during the 2020 Breeding Bird Survey.	Less than local	Very limited use of the proposed development site.

FUTURE BASELINE

- 9.117 If the current land management practices were to continue, the range and condition of habitats currently present is likely to be maintained, which means there are no immediate changes to the ornithological species and populations present on the proposed development.
- 9.118 There may be changes to the ornithological components of the proposed development as a result of wider population changes; some species in the UK are in decline due to pressures elsewhere and some species' ranges are moving northwards as a result of changes in spring temperatures associated with climate change. These changes would generally occur immaterial of whether the proposed development went ahead or not.



Ornithological Features Brought Forward for Assessment

- 9.119 The following applies to all ornithological receptors brought forward to the detailed ornithological impact assessment stage:
 - Their value is assessed as being important at a local or higher level (and / or they are subject to some form of legal protection); and
 - They are potentially vulnerable to significant impacts from the proposed development.
- 9.120 The features which meet those criteria are considered Important Ornithological Features (IOFs) and the ornithological impact assessment concerns such features only. IOFs include the following:
 - Designated sites:
 - Caithness and Sutherland Peatlands SPA / Ramsar;
 - North Caithness Cliffs SPA;
 - Caithness Lochs SPA;
 - West Halladale SSSI;
 - East Halladale SSSI;
 - Red Point Coast SSSI; and
 - Lochan Buidhe Mires SSSI
 - Species:
 - Greylag goose;
 - Pink-footed goose;
 - Curlew;
 - Lapwing;
 - Golden eagle;
 - Whooper swan;
 - Golden plover;
 - Dunlin;
 - Hen harrier;
 - Merlin;
 - Greenshank; and
 - Peregrine.
- 9.121 Although pink-footed goose activity was limited, such that its value was assessed at less than local, due to the presence of flocks of birds a relatively large number of flight seconds at risk were amassed. Collision risk impacts are therefore considered for this species.
- 9.122 Although peregrine activity was limited, such that its value was assessed at less than local, collision risk impacts are considered for this species as the breeding population is a qualifying feature of the North Caithness Cliffs SPA and forms part of the breeding bird assemblage of West Halladale, East Halladale and Lochan Buidhe Mires SSSIs.



IDENTIFICATION AND EVALUATION OF KEY IMPACTS

Mitigation Measures

9.123 In line with current 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.

Construction Phase

- 9.124 Details of construction mitigation measures will be provided in a Construction Environmental Management Plan (outline CEMP provided as **Technical Appendix 3.1**). The CEMP will be submitted to THC for approval, in consultation with NatureScot and SEPA, post-consent but prior to development commencing. The CEMP will include information on the following ecological related activities:
 - Construction works will require a Construction Method Statement (CMS) to be prepared postdetermination and in advance of the commencement of construction on site; and
 - Construction works will be overseen by an Ecological Clerk of Works (ECoW) and their role and responsibilities will be detailed in a CEMP.
- 9.125 Wherever possible, vegetation clearance will take place outside the bird breeding season (i.e. September mid-March). Should this not be possible, then the vegetation to be removed will be searched by a suitably qualified ecologist no more than 24 hours before clearance commences.
- 9.126 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.
- 9.127 In the 12 months before construction commences, breeding raptor surveys should be undertaken (and should also be carried out during construction if construction falls within a breeding season) with the aim of identifying the presence of any Annex 1 or Schedule 1 species which may be disturbed by the construction work.
- 9.128 A tool box talk should also be provided during the induction process, detailing that there may be sensitive species on the proposed development site during the construction period and that case should be taken to avoid disturbing these birds if present and that sightings should be reported to the ECoW for further investigation. These actions should be particularly targeted at hen harrier, merlin and golden eagle.
- 9.129 Should the nest (or where applicable the roost) of an Annex I or Schedule 1 species be present, then disturbance buffers based on Ruddock and Whitfield (2007) should be established around the nest and no construction activity should be allowed within this area. The ECoW should carry out a risk assessment if access roads are within the buffer distance of the nest to establish if they can be used safely.



Operational Phase

- 9.130 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.
- 9.131 This has been provided in outline (**Technical Appendix 8.5**) and will submitted to THC for approval, in consultation with NatureScot, before construction commences. It aims to particularly improve the quality of peatland habitats on the proposed development site.
- 9.132 Post construction monitoring should be undertaken in years 1, 2, 3, 5, 10, 15 and 25 years following operation commencing.
- 9.133 The aim of monitoring would be to monitor bird populations within the proposed development site to ensure that the wind turbines are not having unpredicted adverse effects on the bird populations present, and to ensure that the HMP is effective in supporting the bird populations on the proposed development site.
- 9.134 Although the detailed scope of the monitoring would be agreed with THC in consultation with, NatureScot and RSPB Scotland, the following surveys would be carried out:
 - Breeding bird surveys (using a Brown and Shepherd approach (Brown, A. F. and Shepherd, K. B., 1993)) to allow breeding waders to be monitored across the proposed development site; and
 - Breeding raptor surveys within the proposed development site boundary and where access permits to a distance of 2km from the proposed development site boundary.

Assessment of Construction Phase Impacts

- 9.135 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.
- 9.136 These potential impacts are addressed for each designated site, habitat or species brought forward to assessment in turn.



Designated Sites

Caithness and Sutherland Peatlands SPA / Ramsar

- 9.137 Habitat changes at the proposed development site will have no significant adverse effect upon the Caithness and Sutherland Peatlands SPA / Ramsar. There are no proposals to develop infrastructure within the SPA / Ramsar; all infrastructure will be contained within the proposed development site so there is no direct habitat loss predicted within the SPA/Ramsar.
- 9.138 There is potential for forestry removal to impact on the SPA/Ramsar; this is removing non-native forestry which has the potential to have a displacement effect on some species for which the SPA is designated (for example breeding waders such as golden plover and dunlin may avoid breeding in proximity to woodland due to increased risk of predation). In addition, as detailed in **Technical Appendix 8.5** the intention is to return the habitat to habitat types more akin to those which are present in the SPA / Ramsar and this would have the likely effect of extending the extent of habitats which support SPA species. As such this is likely to have a minor beneficial effect on the SPA.
- 9.139 A number of qualifying species were not recorded during any of the ornithological surveys. As such, effects on short-eared owl, wood sandpiper, common scoter, and wigeon SPA populations are therefore not considered further.
- 9.140 Breeding territories of both black-throated and red-throated diver were identified on lochans to the west of the proposed development site, within the boundaries of the SPA. No territories were identified within the proposed development site and the distance between the working areas of the proposed development and the lochans used exceed the published disturbance distances for this these species. As such, there will be **no significant construction effects** on the SPA population of black-throated and red-throated diver. Confidence in this assessment is considered near certain.
- 9.141 While occasional flights of golden eagle, hen harrier and merlin were all observed during VP surveys, no breeding territories were identified within the proposed development site or survey buffer. As such, it is considered that the proposed development site is used as part of a wider / occasional foraging resource. There will be **no significant construction effects** on the SPA population of golden eagle, hen harrier and merlin. Confidence in this assessment is considered near certain.
- 9.142 Flights of golden plover and dunlin were recorded throughout the survey period and a limited number of breeding territories were identified within the proposed development site and the associated survey buffer, and therefore do not form part of the SPA population. However, given the small numbers in question it is considered that the proposed development site is not of great importance to the SPA populations of either species. As such, there will be **no significant construction effects** on the SPA populations of golden plover and dunlin. Confidence in this assessment is considered near certain.
- 9.143 While a very small number of greenshank flights were recorded during VP surveys, no breeding territory was identified within the proposed development site or survey buffer and the birds were not recorded foraging on site. As such, given the proximity of the SPA, it is considered that the proposed development site maybe used infrequently by wide-ranging, transient birds which form part of the SPA population, although given the absence of classic preferred Greenshank foraging habitat within the proposed development site, it is not of great importance. As such, there will be



no significant construction effects on the SPA population of greenshank. Confidence in this assessment is considered near certain.

9.144 Suitable habitat for breeding greylag goose is limited on the proposed development site. Observations of this species outside key migration months during the 2020 and 2021 baseline surveys indicate records are of birds that do form part of the Ramsar breeding population. Most flights involved small numbers of birds and not the larger flocks which would usually be associated with a migratory population. Given that the majority of the recorded flight activity showed this species as transiting the proposed development site and there is little suitable foraging habitat present, there is the likelihood that a small number of greylag goose flights may be displaced and avoid the proposed development site during construction of the proposed development. There is little evidence of goose flight displacement around wind farms, and flights have been observed crossing over / through turbines. Additionally, as this is likely to be a very small number of flights and given the limited area affected in comparison with the SPA, it is considered that there will be **no significant construction effects** on the Ramsar population of greylag goose. Confidence in this assessment is considered near certain.

North Caithness Cliffs SPA

- 9.145 Habitat changes at the proposed development site will have no significant effect upon the North Caithness Cliffs SPA given the separation distance between the two locations.
- 9.146 For a number of qualifying species, the distance between the two locales means there will be no effects on those species as the distance between the two locations is too great to allow connectivity to occur, particularly since most seabirds will not move inland during the breeding season. Effects on the guillemot, fulmar, black-legged kittiwake, razorbill, puffin and the seabird assemblage SPA populations are therefore not considered further.
- 9.147 Peregrine may be displaced from transiting the proposed development site due to an increased level of disturbance during the construction stage. There is no evidence for displacement of peregrine and they have shown the ability to habituate to humans (for example, by breeding in cities). Additionally, as the recorded activity level is low there is limited opportunity for disturbance to occur, there will be **no significant construction effects** on the SPA population of peregrine. Confidence in this assessment is considered near certain.

Caithness Lochs SPA

- 9.148 Habitat changes at the proposed development site will have no significant effect upon the Caithness Lochs SPA given the separation distance between the two locations.
- 9.149 In relation to Greenland white-fronted goose, no activity was recorded on or near the proposed development site during the ornithological surveys. Effects on the SPA population of Greenland white-fronted goose are therefore not considered further.
- 9.150 Greylag goose and whooper swan may be displaced from transiting the proposed development site due to an increased level of disturbance during the construction stage. However, as the recorded activity is relatively low and it is unclear if it was related to birds from the SPA population, there will be **no significant construction effects** on the SPA populations of greylag goose or whooper swan. Confidence in this assessment is considered near certain.



West Halladale SSSI

- 9.151 Habitat changes at the proposed development site will have no significant effect upon West Halladale SSSI as the effect is predicted to be local, and especially given the absence of breeding on the proposed development site by any of the qualifying species.
- 9.152 Some qualifying species were not recorded during any of the ornithological surveys. As such, effects on the common scoter SSSI population is therefore not considered further.
- 9.153 A breeding territory of black-throated diver was identified on a lochan to the west of the proposed development site, within the boundaries of the SSSI. No territories were identified within the proposed development site. As such, there will be **no significant construction effects** on the SSSI population of black-throated diver given the distance between that lochan and the proposed development. Confidence in this assessment is considered near certain.
- 9.154 Flights of golden plover and dunlin were recorded throughout the survey period and a limited number of breeding territories were identified within the proposed development site and the associated survey buffer, and therefore do not form part of the SSSI population. However, given the small numbers in question it is considered that the proposed development site is not of great importance to the SSSI populations of either species. As such, there will be **no significant construction effects** on the SSSI populations of golden plover and dunlin. Confidence in this assessment is considered near certain.
- 9.155 While a very small number of greenshank flights were recorded during VP surveys, no breeding territory was identified within the proposed development site or survey buffer. As such, given the proximity of the SSSI, it is considered that the proposed development site is used infrequently by wide-ranging, transient birds which may form part of the SSSI population and is not of great importance. As such, there will be **no significant construction effects** on the SSSI population of greenshank. Confidence in this assessment is considered near certain.
- 9.156 While occasional flights of golden eagle, hen harrier, merlin and peregrine were all observed during VP surveys, no breeding territory was identified within the proposed development site or survey buffer. As such, it is considered that the proposed development site is used as part of a wider foraging resource. There will be **no significant construction effects** on the SSSI populations of golden eagle, hen harrier, merlin and peregrine. Confidence in this assessment is considered near certain.
- 9.157 Given that the East Halladale SSSI is a constituent part of the larger Caithness and Sutherland Peatlands Ramsar, effects on the SSSI population of greylag goose are considered in paragraph 9.150.

East Halladale SSSI

- 9.158 Habitat changes at the proposed development site will have no significant effect upon the East Halladale SSSI given the separation distance between the two locations.
- 9.159 Some qualifying species were not recorded during any of the ornithological surveys. As such, effects on the common scoter SSSI population is therefore not considered further.



- 9.160 Breeding territories of both black-throated and red-throated diver were identified on lochans to the west of the proposed development site, within the boundaries of West Halladale SSSI. No territories were identified within the proposed development site. As such, there will be **no significant construction effects** on the East Halladale SSSI population of black-throated and red-throated diver. Confidence in this assessment is considered near certain.
- 9.161 Flights of golden plover and dunlin were recorded throughout the survey period and a limited number of breeding territories were identified within the proposed development site and the associated survey buffer, and therefore do not form part of the SSSI population. However, given the small numbers in question it is considered that the proposed development site is not of great importance to the SSSI populations of either species. As such, there will be **no significant construction effects** on the SSSI populations of golden plover and dunlin. Confidence in this assessment is considered near certain.
- 9.162 Peregrine may be displaced from transiting the proposed development site due to an increased level of disturbance during the construction stage. There is no evidence for displacement of peregrine and they have shown the ability to habituate to humans (for example, by breeding in cities). However, as the recorded activity level is low, there will be **no significant construction effects** on the SSSI population of peregrine. Confidence in this assessment is considered near certain.
- 9.163 While occasional flights of golden eagle and merlin were all observed during VP surveys, no breeding territory was identified within the proposed development site or survey buffer. As such, it is considered that the proposed development site is used as part of a wider foraging resource. There will be **no significant construction effects** on the SSSI population of golden eagle, hen harrier and merlin. Confidence in this assessment is considered near certain.
- 9.164 Given that the East Halladale SSSI is a constituent part of the larger Caithness and Sutherland Peatlands Ramsar, effects on the SSSI population of greylag goose are considered in paragraph 9.150.

Red Point Coast SSSI

- 9.165 Habitat changes at the proposed development site will have no significant effect upon the Red Point Coast SSSI given the separation distance between the two locations.
- 9.166 For the breeding population of guillemot (qualifying feature of the SSSI), the distance between the two locales means there will be no effects as the distance between the two locations is too great to allow connectivity to occur. Effects on SSSI population of guillemot are therefore not considered further.

Lochan Buidhe Mires SSSI

- 9.167 Habitat changes at the proposed development site will have no significant effect upon the Lochan Buidhe Mires SSSI given the separation distance between the two locations.
- 9.168 Breeding populations of dunlin, greenshank, golden plover, red-throated diver, black-throated diver, merlin and peregrine form part of the breeding bird assemblage of the SSSI. Given the separation distance between the proposed development site and the SSSI, and the proximity of



other designated sites for which these species are a listed qualifying feature, it is considered that there will be **no significant construction effects** on the breeding populations of dunlin, greenshank, golden plover, red-throated diver, black-throated diver, merlin and peregrine of Lochan Buidhe Mires SSSI. Confidence in this assessment is considered near certain.

- 9.169 It is considered that the limited level of activity of curlew recorded at the proposed development site is associated with locally breeding birds and so do not form part of the SSSI population. Therefore, it is considered that there will be **no significant construction effects** on the SSSI population of curlew. Confidence in this assessment is considered near certain.
- 9.170 A breeding population of greylag goose also form part of the breeding bird assemblage of the SSSI. While the separation distance between the SSSI and the proposed development is relatively small, species activity recorded on and around the proposed development is considered part of the Caithness and Sutherland Peatlands Ramsar population as the Ramsar is immediately adjacent to the west of the proposed development. However, considering the relatively short separation distance between the Ramsar and the SSSI, there may be a degree of interaction between the Ramsar and the SSSI populations. The recorded level of activity is relatively low and it is considered that the proposed development site is not limited value, being assessed as being of local importance to this species. As such, there will be **no significant construction effects** on the SSSI population of greylag goose. Confidence in this assessment is considered near certain.
- 9.171 It is documented that golden eagle range over relatively large distances. Therefore, activity recorded at the proposed development site could theoretically be from birds that form part of the SSSI population. However, breeding populations of golden eagle are listed as qualifying features of the Caithness and Sutherland Peatlands SPA, West Halladale SSSI and East Halladale SSSI, all of which are significantly closer to the proposed development site than Lochan Buidhe Mires SSSI. Therefore, it is considered that the very limited level of activity recorded on site is from wide-ranging birds that form part of the SPA / West Halladale SSSI / East Halladale SSSI populations as opposed to the Lochan Buidhe Mires SSSI population. As such, there will be **no significant construction effects** on the Lochan Buidhe Mires SSSI population of golden eagle. Confidence in this assessment is considered near certain.

Species

Greylag Goose

- 9.172 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on greylag goose. Confidence in this assessment is considered near certain.
- 9.173 No evidence of greylag goose breeding was recorded during the baseline surveys, with activity limited to flights transiting the proposed development site. There could be limited displacement effects during construction, with greylag goose avoiding transiting over the proposed development during the construction period. However, greylag goose are generally tolerant of human activity as evidenced by their presence in towns and cities (Forrester, 2007).
- 9.174 It is considered likely there will be limited effects on this species and no change in their occurrence is expected. Any effects will be **not significant**. Confidence in this assessment is considered near certain.



Pink-footed Goose

- 9.175 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on pink-footed goose. Confidence in this assessment is considered near certain.
- 9.176 Pink-footed goose only breed in the UK in very small numbers, generally as migrants which have failed to return to their Arctic breeding grounds. As such, there will be no impacts on breeding geese. There could be limited displacement effects during construction, with potential for pink-footed goose to avoiding transiting over the proposed development during the construction period. However, the evidence for this is limited, and given most flights occurred during migration periods any effects would be very limited.
- 9.177 It is considered likely there will be limited effects on this species and no change in their occurrence is expected. Any effects will be **not significant**. Confidence in this assessment is considered near certain.

Curlew

- 9.178 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on curlew. Confidence in this assessment is considered near certain.
- 9.179 Curlews are known to be sensitive to construction disturbance (Pearce-Higgins, 2012) with reductions of up to 40% occurring within 650m of wind farm developments (although other studies have not found this effect (Whitfield, 2010)).
- 9.180 No confirmed breeding territories were identified within the proposed development site, with one possible territory in the survey buffer to the north east in 2020, and one probable territory to the west of turbine 4 and one possible territory in the survey buffer to the north in 2021 (**Figures 9.3** and **9.4** refer).
- 9.181 It is, therefore, considered possible that there may be a reduction in breeding activity in the vicinity of the proposed development. There is a displacement effect which commences during the construction period. Construction of the proposed development may result in the loss of up to one breeding pair as a result of disturbance. However, the impact is considered reversible, especially considering the absence of a confirmed breeding population at the proposed development site and the relatively widespread potentially available breeding habitat, which will be increased by the removal of forest plantation in the north west. Any effects are therefore considered to be **not significant**. Confidence in this assessment is considered near certain.

Lapwing

- 9.182 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on lapwing. Confidence in this assessment is considered near certain.
- 9.183 Experience during wind farm construction has demonstrated that lapwing are unlikely to suffer displacement effects during the construction phase, with birds continuing to breed on site during



the construction process on wind farms Atmos has been involved in. There may be some limited disturbance effects which will be localised within the proposed development site. These effects are considered **not significant**. Confidence in this assessment is considered near certain.

Golden Eagle

- 9.184 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on golden eagle. Confidence in this assessment is considered near certain.
- 9.185 Any disturbance impacts on golden eagle during construction of the proposed development will be limited as there are no golden eagle territories within the area where disturbance effects could occur. Confidence in this assessment is considered near certain.
- 9.186 There could be limited displacement effects during construction, with golden eagles avoiding foraging over the proposed development during the construction period. Displacement effects are considered to be **not significant**, given the area over which these individuals are likely to be ranging, and the very limited activity recorded. Confidence in this assessment is considered probable.

Whooper Swan

- 9.187 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on whooper swan. Confidence in this assessment is considered near certain.
- 9.188 No evidence of whooper swan breeding was recorded during the surveys with activity limited to flights transiting the proposed development. There could be limited displacement effects during construction, with whooper swan avoiding transiting over the proposed development during the construction period.
- 9.189 It is considered likely there will be limited effects on this species and no change in their occurrence is expected. Any effects will be **not significant**. Confidence in this assessment is considered near certain.

Golden Plover

- 9.190 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on golden plover. Confidence in this assessment is considered near certain.
- 9.191 There is evidence of golden plover both being sensitive to wind farm development (Samson, 2016), and on a longer term survey, being resilient to wind farm development (Fielding and Haworth, 2013).
- 9.192 No confirmed breeding territories were identified within the proposed development site, with one probable territory in the survey buffer to the west in 2020, and two probable territories (to the west and east of turbine 5) and two possible territories (in the survey buffer to the south west) in 2021 (Figures 9.3 and 9.4 refer).



9.193 It is, therefore, considered possible that there may be a reduction in breeding activity around the proposed development site. Construction of the proposed development could result in the loss of up to two probable breeding pairs as a result of disturbance. Whilst the impact will be irreversible, the impact on a golden plover population of local importance will be small. Any effects are therefore considered to be **not significant**. Confidence in this assessment is considered near certain.

Dunlin

- 9.194 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on dunlin. Confidence in this assessment is considered near certain.
- 9.195 No confirmed breeding territories were identified within the proposed development site, with one probable territory in the survey buffer to the west in 2020, and one probable territory (in the survey buffer to the west) and one possible territory (within the proposed development site, to the east of turbines 5 and 6) in 2021 (**Figures 9.3** and **9.4 refer**).
- 9.196 There is no evidence for displacement of dunlin by windfarms and there was only one possible territory located within the proposed development in one year. Displacement of this territory could occur during construction. However, the impact is considered reversible, especially considering the absence of a confirmed breeding population at the proposed development site and the relatively widespread potentially available breeding habitat. Any effects are therefore considered to be **not significant**. Confidence in this assessment is considered near certain.

Hen Harrier

- 9.197 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on hen harrier. Confidence in this assessment is considered near certain.
- 9.198 Any disturbance impacts on hen harrier during construction of the proposed development will be limited as there are no hen harrier territories within the area where disturbance effects could occur, and recorded activity on the proposed development site was limited. As such they would be **not significant.** Confidence in this assessment is considered near certain.
- 9.199 Hen harriers are known to be relatively tolerant of wind farms, such that displacement effects are limited (Haworth and Fielding, 2013). Displacement effects are considered to be **not significant**, given the very limited activity recorded. Confidence in this assessment is considered probable.

Merlin

- 9.200 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on merlin. Confidence in this assessment is considered near certain.
- 9.201 There will be no significant disturbance effects on merlin during construction. No territories were recorded either on the proposed development site or within the buffer, and the recorded activity was limited. There could be limited displacement effects during the construction phase, with merlin avoiding foraging over the proposed development site.



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

Greenshank

- 9.203 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on greenshank. Confidence in this assessment is considered near certain.
- 9.204 There will be no significant disturbance effects on greenshank during construction. There was no evidence of greenshank breeding on or around the proposed development site, and recorded activity was limited.
- 9.205 It is considered likely there will be limited effects on this species and no change in their occurrence is expected. Any effects will be **not significant**. Confidence in this assessment is considered near certain.

Peregrine

- 9.206 The extent of direct and indirect habitat loss associated with the construction works will have **no significant construction effects** on peregrine. Confidence in this assessment is considered near certain.
- 9.207 There will be no significant disturbance effects on peregrine during construction. No territories were recorded either on the proposed development site or within the buffer, and the recorded activity was limited. There could be limited displacement effects during the construction phase, with peregrine avoiding foraging over the proposed development site.
- 9.208 Given the widespread availability of similar habitat in the wider area, displacement effects are considered **not significant**, given the area over which these individuals are likely to be ranging. Confidence in this assessment is considered probable.

Assessment of Operational Phase Impacts

- 9.209 The following impacts are considered for the operational phase:
 - Disturbance / displacement (including barrier effects); and
 - Additional mortality as a result of collision risk.
- 9.210 Not all species were observed to have enough flight activity at collision risk height to warrant collision risk modelling being carried out. The following species are assessed for collision risk:
 - Curlew;
 - Dunlin;
 - Golden eagle;



- Golden plover;
- Greylag goose;
- Hen harrier;
- Lapwing;
- Pink-footed goose; and
- Whooper swan.
- 9.211 For all other species, levels of observed flight activity indicated that the effects of additional collision risk will be so small as to be undetectable and therefore **not significant**.
- 9.212 The parameters used within the collision risk model (CRM) for those species listed above are provided in **Table 9-21**. A random CRM exercise was undertaken for all species.

Species	Bird Length (m)	Wingspan (m)	Bird speed (m/s)	Avoidance rate	Months Active	Daylight hours	Night-time hours	Total hours	Assumed activity period	Flapping / Gliding
Curlew	0.55	0.9	16.3	0.980	March - August	2888.65	0.00	2888.65	Daylight hours only	F
Dunlin	0.18	0.40	15.3	0.980	March - August	2888.65	0.00	2888.65	Daylight hours only	F
Golden eagle	0.82	2.12	11.9	0.990	All year	4517.57	0.00	4517.57	Daylight hours only	G
Golden plover	0.28	0.72	13.7	0.980	March - September	3273.19	465.98	3739.17	Daylight hours plus 25% nocturnal hours	F
Greylag goose	0.82	1.64	17.1	0.998	All year	4517.57	0.00	4517.57	Daylight hours only	F

Table 9-21: CRM Biometric Parameters



Hen harrier	0.48	1.10	9.1	0.990	All year	4517.57	0.00	4517.57	Daylight hours only	G
Lapwing	0.30	0.84	12.8	0.980	March - September	3273.19	0.00	3273.19	Daylight hours only	F
Pink- footed goose	0.68	1.52	17.1	0.998	September - March	1996.29	0.00	1996.29	Daylight hours only	F
Whooper swan	1.52	2.30	17.3	0.995	September - March	1996.29	0.00	1996.29	Daylight hours only	F

Designated Sites

Caithness and Sutherland Peatlands SPA / Ramsar

- 9.213 Collision risk is considered separately within each species account.
- 9.214 A number of qualifying species were not recorded during any of the ornithological surveys. As such, effects on short-eared owl, wood sandpiper, common scoter, and wigeon SPA populations are therefore not considered further.
- 9.215 Breeding territories of both black-throated and red-throated diver were identified on lochans to the west of the proposed development site, within the boundaries of the SPA. No territories were identified within the proposed development site and no birds were observed flying within the proposed development site. Given the separation distance between the lochans and the nearest element of the proposed development, it is considered that there will be **no significant disturbance** / displacement operational effects on the SPA population of black-throated and red-throated diver. Confidence in this assessment is considered near certain.
- 9.216 While occasional flights of golden eagle, hen harrier and merlin were all observed during VP surveys, no breeding territory was identified within the proposed development site or survey buffer. As such, it is considered that the proposed development site is used as part of a wider foraging resource. The wind turbines may cause a barrier effect with individuals offsetting flight paths to avoid flying over the proposed development. Even if this displacement was to occur on movements around the proposed development, given the relative infrequency of movements across the proposed development site, while there may be a slight energetic constraint, it is considered that there will be **no significant disturbance / displacement operational effects** on the SPA population of golden eagle, hen harrier and merlin. Confidence in all of these assessments is considered near certain.
- 9.217 With regards merlin, the level of flight activity recorded (all flights observed were below risk height) was so small, that the potential collision risk for this species as a result of the proposed development is considered to be near zero; there will be **no significant operational effect** on the



SPA population of merlin as a result of collision risk. Confidence in this assessment is considered near certain.

- 9.218 With regards golden plover, flights (predominantly below risk height) were recorded during VP surveys but no confirmed breeding territory was identified within the proposed development site or survey buffer. There was one probable breeding territory identified in the proposed development site buffer to the west in 2020, and two probable territories (to the west and east of turbine 5) and two possible territories (in the survey buffer to the south west) in 2021 (**Figures 9.3** and **9.4** refer). Birds breeding outwith the SPA do not form part of the SPA population.
- 9.219 There is contradictory evidence for impacts of wind farms on golden plover; with studies finding displacement effects (Samson *et al* 2016) and no displacement effects (Fielding and Haworth 2013) (Douglas *et al* 2011). Therefore, it is considered that there will be disturbance / displacement effects on two probable breeding pairs. However, since birds on the proposed development are outwith the SPA population there will be **no significant operational effect** on the SPA population of golden plover. Confidence in this assessment is considered near certain.
- 9.220 With regards dunlin, flights (at and below risk height) were recorded during VP surveys but no confirmed breeding territory was identified within the proposed development site or survey buffer. There was one probable breeding territory in the survey buffer to the west of the proposed development site in 2020, and one probable breeding territory (in the survey buffer to the west of the proposed development site) and one possible breeding territory (within the proposed development site, to the east of turbines 5 and 6) in 2021 (Figures 9.3 and 9.4 refer).
- 9.221 There is no evidence for negative impacts on dunlin as a result of wind farms, and they have been found to be relatively tolerant of recreational disturbance (Pearce-Higgins *et al.*, 2007). However, the pair most likely to be affected by any displacement does not form part of the SPA population since it is outwith the SPA. As such, there will be **no significant operational effect** on the SPA population of dunlin. Confidence in this assessment is considered near certain.
- 9.222 With regards greenshank, flights (at risk height) and ground registrations of individual birds were recorded during VP surveys but no breeding territory was identified within the proposed development site or survey buffer. No activity was recorded within the proposed development site. The wind turbines may cause a barrier effect with individuals offsetting flight paths to avoid flying through the proposed development. Even if this displacement was to occur on movements around the proposed development, given the relative infrequency of movements across the proposed development site, while there may be a slight energetic constraint, it is considered that there will be **no significant disturbance / displacement operational effects** on the SPA population of greenshank.
- 9.223 The level of flight activity recorded was so small, and given the absence of any flight behaviour within the proposed development site, the potential collision risk for this species as a result of the proposed development is considered to be near zero; there will be **no significant operational effect** on the SPA population of greenshank as a result of collision risk. Confidence in the assessments for this species is considered near certain.
- 9.224 Suitable habitat for breeding greylag goose is limited on the proposed development site. Observations of this species outside key migration months during the 2020 and 2021 baseline surveys indicate there is the possibility that some records are of birds that do form part of the



Ramsar breeding population. Most flights involved small numbers of birds and not the larger flocks which would usually be associated with a migratory population. Given that the majority of the recorded flight activity showed this species as transiting the proposed development site, there is the likelihood that a small number of greylag goose flights may be displaced and avoid transiting the proposed development site during operation of the proposed development. Even if the proposed development has a displacement effect, avoidance behaviour will cause birds to veer away from flying through / over the proposed development. Such behaviour has been noted (Rees, 2012) but does not consistently occur. Given that individual birds will only fly over this area once or twice per year, it is considered that there will be **no significant operational effects**.

- 9.225 Barrier effects of wind turbines have been identified which, for commuting geese, typically involved avoiding flying over a wind farm itself by offsetting flight paths by a few hundred metres. This was not a consistent effect and was only observed in some locations (Rees, 2012). Even if this displacement was to occur on movements around the proposed development, given the relative infrequency of movements across the proposed development, while there may be a slight energetic constraint, this is considered to be **not significant**.
- 9.226 As a result, there will be **no significant** effect on resident birds commuting between breeding locations and feeding sites as a result of displacement or barrier effects on those populations of geese. Confidence in these assessments for this species is considered near certain.

North Caithness Cliffs SPA

- 9.227 For a number of qualifying species, the distance between the two locales and the fact that seabird species rarely move inland means there will be no impacts on those species as the distance does not allow connectivity to occur. Effects on the guillemot, fulmar, black-legged kittiwake, razorbill and puffin SPA populations are therefore not considered further.
- 9.228 There is the potential for observations of peregrine to be of birds which form part of the SPA population. However, as the recorded activity is low, there will be **no significant disturbance / displacement operational effects** on the SPA population of peregrine.
- 9.229 The level of flight activity recorded was so small, with those flights within the proposed development site at below risk height, the potential collision risk for peregrine as a result of the proposed development is considered to be near zero; there will be **no significant operational effect** on the SPA population of peregrine as a result of collision risk. Confidence in these assessments for this species is considered near certain.

Caithness Lochs SPA

- 9.230 Collision risk is considered separately within each species account.
- 9.231 For some qualifying species, the lack of any observations from any of the baseline surveys would indicate that the proposed development site and / or immediate airspace is of no importance for a particular species. Effects on Greenland white-fronted goose are therefore not considered further.
- 9.232 Suitable habitat for wintering greylag goose and whooper swan is limited on the proposed development site. Observations of greylag goose outside key migration months during the 2020 and 2021 baseline surveys indicate that these records are of birds that do not form part of the SPA



non-breeding population. Most flights involved small numbers of birds and not the larger flocks which would usually be associated with migratory populations of both species. Given that the majority of the recorded flight activity showed these species as transiting the proposed development site, there is the likelihood that a small number of greylag goose and whooper swan flights may be displaced and avoid transiting the proposed development site during operation of the proposed development. Even if the proposed development has a displacement effect, avoidance behaviour will cause birds to veer away from flying through / over the proposed development. Such behaviour has been noted (Rees, 2012) but does not consistently occur. Given that individual birds will only fly over this area once or twice per year, it is considered that there will be **no significant operational effects**.

- 9.233 Barrier effects of wind turbines have been identified which, for commuting geese and swans, typically involved avoiding flying over a wind farm itself by offsetting flight paths by a few hundred metres. This was not a consistent effect and was only observed in some locations (Rees, 2012). Even if this displacement was to occur on movements around the proposed development, given the relative infrequency of movements across the proposed development, while there may be a slight energetic constraint, this is considered to be **not significant**.
- 9.234 As a result, there will be **no significant** effect on migratory geese / swans overflying the proposed development as a result of displacement or barrier effects on those populations of geese / swans. Confidence in these assessments of the effects on the SPA is considered near certain.

West Halladale SSSI

- 9.235 Collision risk is considered separately within each species account.
- 9.236 Some qualifying species were not recorded during any of the ornithological surveys. As such, effects on common scoter SSSI populations are therefore not considered further.
- 9.237 Given that the West Halladale SSSI is a constituent part of the larger Caithness and Sutherland Peatlands SPA / Ramsar, and share a number of qualifying species, effects on SSSI populations of dunlin, golden plover, greenshank, greylag goose, hen harrier, merlin, and golden eagle are considered in paragraphs 9.216 9.226.
- 9.238 There is the potential for observations of peregrine to be of birds which form part of the SSSI population. However, as the recorded activity is low, there will be **no significant disturbance / displacement operational effects** on the SSSI population of peregrine.
- 9.239 The level of flight activity recorded was so small, with those flights within the proposed development site at below risk height, the potential collision risk for peregrine as a result of the proposed development is considered to be near zero; there will be **no significant operational effect** on the SSSI population of peregrine as a result of collision risk. Confidence in these assessments for this SSSI is considered near certain.

East Halladale SSSI

9.240 Collision risk is considered separately within each species account.



- 9.241 Some qualifying species were not recorded during any of the ornithological surveys. As such, effects on the common scoter SSSI population is therefore not considered further.
- 9.242 Given that the East Halladale SSSI is a constituent part of the larger Caithness and Sutherland Peatlands SPA / Ramsar, and share a number of qualifying species, effects on SSSI populations of dunlin, golden plover, black-throated diver, red-throated diver, greylag goose, golden eagle and merlin are considered in paragraphs 9.216 – 9.226.
- 9.243 Effects on the SSSI population of peregrine are considered in paragraphs 9.238 9.234.

Red Point Coast SSSI

9.244 For the breeding population of guillemot (qualifying feature of the SSSI), the distance between the proposed development site and the SSSI, and the fact that guillemot rarely move inland means there will be no operational effects as the distance between the two locations is too great to allow connectivity to occur. Effects on SSSI population of guillemot are therefore not considered further.

Lochan Buidhe Mires SSSI

- 9.245 Collision risk is considered separately within each species account.
- 9.246 Breeding populations of dunlin, greenshank, golden plover, red-throated diver, black-throated diver, merlin and peregrine form part of the breeding bird assemblage of the SSSI. Given the separation distance between the proposed development site and the SSSI, and the proximity of other designated sites for which these species are a listed qualifying feature, it is considered that there will be **no significant operational effects** on the breeding bird populations of dunlin, greenshank, golden plover, red-throated diver, black-throated diver, merlin and peregrine of Lochan Buidhe Mires SSSI. Confidence in these assessments is considered near certain.
- 9.247 It is documented that golden eagle range over relatively large distances. Therefore, activity recorded at the proposed development site could theoretically be from birds that form part of the SSSI population. However, breeding populations of golden eagle are listed as qualifying features of the Caithness and Sutherland Peatlands SPA, West Halladale SSSI and East Halladale SSSI, all of which are significantly closer to the proposed development site than Lochan Buidhe Mires SSSI. Therefore, it is considered that the very limited level of activity recorded on site is from wide-ranging birds that form part of the SPA / West Halladale SSSI / East Halladale SSSI populations as opposed to the Lochan Buidhe Mires SSSI population. As such, there will be **no significant operational effects** on the Lochan Buidhe Mires SSSI population of golden eagle. Confidence in this assessment is considered near certain.
- 9.248 Given that the Lochan Buidhe Mires SSSI is a constituent part of the larger Caithness and Sutherland Peatlands Ramsar, and share qualifying species, effects on the SSSI population of greylag goose is considered in paragraphs 9.229 – 9.231.
- 9.249 It is considered that the limited level of activity of curlew recorded at the proposed development site is associated with locally breeding birds and so do not form part of the SSSI population. Therefore, it is considered that there will be **no significant operational effects** on the SSSI population of curlew. Confidence in this assessment is considered near certain.



Species

Greylag Goose

- 9.250 No breeding attempts were recorded during the field surveys. The breeding population of greylag goose is a qualifying feature of the Caithness and Sutherland Peatlands Ramsar, and is part of the breeding bird assemblage of West Halladale, East Halladale and Lochan Buidhe Mires SSSIs. The wintering population is a qualifying feature of the Caithness Lochs SPA. This species has been observed transiting across the proposed development site below, at and above collision risk height.
- 9.251 Suitable habitat for breeding greylag goose is limited on the proposed development site. Observations of this species all year round indicate there is the possibility that some records are of birds that do form part of the Ramsar or SSSIs breeding populations, with some flights in the key migration months of September / October and February / March potentially being part of the overwintering population of Caithness Lochs SPA, or of birds staging through the area and moving further south. Most flights involved small numbers of birds and not the larger flocks which would usually be associated with a migratory population. Given that the majority of the recorded flight activity showed this species as transiting the proposed development site, there is the likelihood that a small number of greylag goose flights may be displaced and avoid transiting the proposed development site during operation of the proposed development. Even if the proposed development has a displacement effect, avoidance behaviour will cause birds to veer away from flying through / over the proposed development. Such behaviour has been noted (Rees, 2012) but does not consistently occur. Given that individual birds will only fly over this area once or twice per year, it is considered that there will be no significant operational effects on birds that do not form part of the SPA / Ramsar / SSSI populations.
- 9.252 Barrier effects of wind turbines have been identified which, for commuting geese, typically involved avoiding flying over a wind farm development by offsetting flight paths by a few hundred metres. This was not a consistent effect and was only observed in some locations (Rees, 2012). Even if this displacement was to occur on movements around the proposed development, given the relative infrequency of movements across the proposed development, while there may be a slight energetic constraint, this is considered to be **not significant**.
- 9.253 As a result, there will be **no significant** effect on either migratory geese overflying the proposed development or resident birds commuting breeding locations and feeding sites as a result of displacement or barrier effects on those populations of geese.
- 9.254 **Table 9-22** shows the estimated collision risk for greylag goose. Given this will fall mainly on the British breeding population, which is expanding strongly, it is considered that there will be **no significant operational effects**. Confidence in these assessments for this species is considered near certain.



Species	Annual Collision Risk	No. of years per collision	No. of collisions over 30 years
Greylag goose	0.203	4.926	6.609

Table 9-22: Collision risk estimate for Greylag Goose

Pink-footed Goose

- 9.255 The baseline surveys indicated that pink-footed goose did not use the proposed development site for foraging, however, flight activity was recorded over the proposed development site at and above collision risk height. As such, displacement and barrier effects from the proposed development could affect this species.
- 9.256 Migration movements are highly unlikely to be affected by the presence of a wind farm development, given the birds are making relatively high altitude, long distance flights between staging areas. Even if the wind farm has a displacement effect, avoidance behaviour will cause birds to veer away from flying through / over the proposed development. Such behaviour has been noted (Rees, 2012) but does not consistently occur. Given that individual birds will only fly over this area once or twice per year, it is considered that there will be **no significant operational effects**.
- 9.257 Similarly, the same review identified some barrier effects of wind turbines which for commuting geese typically involved avoiding flying over a wind farm development by offsetting flight paths by a few hundred metres. This was not a consistent effect and was only observed in some locations (Rees, 2012). Even if this displacement effect was to occur on movements around the proposed development, given the relative infrequency of movements across the proposed development, while there may be a slight energetic constraint, this is considered to be **not significant**.
- 9.258 As a result, there will be **no significant** effect on migratory geese overflying the proposed development as a result of displacement or barrier effects on those populations of geese.
- 9.259 **Table 9-23** shows the estimated collision risk for pink-footed goose. The loss of one bird over the life time of the proposed development, when compared to the NHZ population (peak count of wintering pink-footed goose estimated at 2,070 (Wilson, 2015)), will **not give rise to a significant operational effect** on pink-footed goose. Confidence in these assessments for this species is considered near certain.

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 30 years
Pink-footed goose	0.029	34.483	0.87

Table 9-23: Collision risk estimate for Pink-footed Goose

Curlew

9.260 The breeding population of curlew is part of the breeding bird assemblage of Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest



point), and this species has been observed transiting the proposed development site below and at collision risk height, together with individuals on the ground.

- 9.261 No confirmed territories were identified within the proposed development site, with one possible territory in the survey buffer to the north east in 2020, and one probable territory to the west of turbine 4 and one possible territory in the survey buffer to the north in 2021 (**Figures 9.3** and **9.4** refer).
- 9.262 The displacement effect of the proposed development has already been described within the construction assessment (paragraphs 9.178 9.181 refer). Research has shown that displacement effects perpetuate into the operational phase of wind farm developments, therefore, there was little recovery of curlew breeding populations (Pearce-Higgins, 2012). As such, the territories lost during the construction phase are unlikely to return to their original location and will be considered to be lost across the lifetime of the proposed development.
- 9.263 This would amount to a potential predicted loss of 1 probable curlew territory. However, it is considered that the overall impact can be reduced, especially considering the absence of a confirmed breeding population at the proposed development site and the relatively widespread potentially available breeding habitat which would allow for displacement over loss. Predator control will likely improve the productivity of the remaining local population which will likely offset the territory loss going forward. The number of territories lost is small in comparison to the local population so although the effect is likely to persist through the lifetime of the proposed development, there will be **no significant operational effects**.
- 9.264 **Table 9-24** shows the estimated collision risk for curlew. The collision risk model has predicted the loss of one bird over the lifetime of the proposed development. It should be remembered that if displacement occurs, then collision risk would be reduced; this level of collision risk is predicated on no displacement occurring. Therefore, there will be **no significant operational effects** on curlew as a result of collisions with the proposed development when compared to the wider population of the NHZ (1,737 pairs (Wilson, 2015)). Confidence in the assessments for this species considered probable.

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 30 years
Curlew	0.031	32.258	0.93

Table 9-24: Collision risk estimate for Curlew

Lapwing

- 9.265 There is no evidence that wind farm developments displace lapwing (Pearce-Higgins, 2012), as such no displacement or disturbance effects are predicted on territories within or around the proposed development site. Therefore, it is considered there would be **no significant operational effects**. Confidence in this assessment is considered near certain.
- 9.266 No confirmed territories were identified within the proposed development site, with one possible territory in the survey buffer to the north east in 2020 and no territories in 2021 (**Figures 9.3** and **9.4** refer).



- 9.267 It is therefore considered unlikely that there would be displacement of lapwing as a result of the wind farm. In Atmos' experience, lapwing have been recorded breeding amongst turbines at operational wind farms. This will result in a **not significant** effect. Confidence in this assessment is considered near certain.
- 9.268 **Table 9-25** shows the estimated collision risk for lapwing. Given the mitigation identified for the proposed development, which will include both habitat management and targeted predator control, it is considered that there would be a limited impact on lapwing. In the absence of an estimated population for the NHZ, the loss of less than one bird over the lifetime of the proposed development will not give rise to a significant operational effect on the lapwing population when compared with the Scottish population (estimated at 71,500 105,600 (Forrester, 2007)). It is worth noting that this figure is likely to have declined since the estimate was made, however, lapwing is widely distributed across Caithness and Sutherland. Confidence in this assessment is considered probable.

Table 9-25: Collision risk estimate for Lapwing

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 30 years
Lapwing	0.015	66.666	0.45

Golden Eagle

- 9.269 The breeding population of golden eagle is one of the qualifying features of the Caithness and Sutherland Peatlands SPA (located immediately adjacent to the west of the proposed development). The breeding population of golden eagle also forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (located immediately adjacent to the west of the proposed development), East Halladale SSSI (located approximately 1.50km east of the proposed development site at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).
- 9.270 No breeding attempts were recorded during the field surveys and activity over the proposed development site was limited. There is no suitable breeding habitat within the proposed development site.
- 9.271 A long term study at Benn an Tuirc Wind Farm (Walker, McGrady, McCluskie, Madders, & Mcleod, 2016) showed that golden eagle will avoid the turbine array but there were no other detectable effects of the presence of a wind farm development in an eagle's range. Birds continued to hunt in proximity to the wind farm. As such, given the design and scale of the proposed development, and the limited activity observed across the proposed development site, there will be **no significant operational effects** on golden eagle, given the large range of this species and the relatively small scale of the proposed development in an open environment with few other constraints. However, the impacts will be long term in duration.
- 9.272 **Table 9-26** shows the estimated collision risk for golden eagle. The collision risk model has predicted the loss of significantly less than one bird over the lifetime of the proposed development. Therefore, there will be **no significant operational effects** on golden eagle as a result of collisions with the proposed development when compared to the wider population of the NHZ (18 occupied



breeding territories (Wilson, 2015)). Confidence in these assessments for this species is considered probable.

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 30 years
Golden eagle	0.008	125	0.24

Table 9-26: Collision risk estimate for Golden Eagle

Whooper Swan

- 9.273 The wintering population of whooper swan is a qualifying feature of the Caithness Lochs SPA. This species has been observed transiting across the proposed development site at and above collision risk height. No breeding was recorded.
- 9.274 As such, displacement and barrier effects of the proposed development could affect this species.
- 9.275 Migration movements are highly unlikely to be affected by the presence of wind turbines, given the birds are making relatively high altitude, long distance flights between staging areas. Even if the proposed displacement has a displacement effect, avoidance behaviour will cause birds to veer away from flying through / over the proposed development. Such behaviour has been noted (Rees, 2012) but does not consistently occur. Given that individual birds will only fly over this area once or twice per year, it is considered that there will be no significant operational effects.
- 9.276 Similarly, the same review identified some barrier effects of wind turbines which for commuting swans typically involved avoiding flying over a wind farm development by offsetting flight paths by a few hundred metres. This was not a consistent effect and was only observed in some locations (Rees, 2012). Even if this displacement effect was to occur on movements around the proposed development, given the relative infrequency of movements across the proposed development, while there may be a slight energetic constraint, this is considered to be **not significant**.
- 9.277 As a result, there will be **no significant** effect on migratory swans overflying the proposed development as a result of displacement or barrier effects on those populations of swans.
- 9.278 **Table 9-27** shows the estimated collision risk for whooper swan. The loss of significantly less than one bird over the life time of the proposed development, when compared to the NHZ population (peak count of wintering whooper swan estimated at 190 (Wilson, 2015)), will **not give rise to a significant operational effect** on whooper swan. Confidence in these assessments for this species is considered near certain.

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 30years
Whooper swan	0.006	166.666	0.18

Table 9-27: Collision risk estimate for Whooper Swan



Golden Plover

- 9.279 The breeding population of golden plover is one of the qualifying features of the Caithness and Sutherland Peatlands SPA (located immediately adjacent to the west of the proposed development). The breeding population of golden plover also forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (located immediately adjacent to the west of the proposed development) and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development at its closest point). The breeding population is also one of the qualifying features of the East Halladale SSSI (located approximately 1.50km east of the proposed development at its closest point).
- 9.280 This species has been observed transiting the proposed development site below and at collision risk height, together with individuals on the ground.
- 9.281 No confirmed territories were identified within the proposed development site, with one probable territory in the survey buffer to the west in 2020, and two probable territories (to the west and east of turbine 5) and two possible territories (in the survey buffer to the south west) in 2021 (Figures 9.3 and 9.4 refer).
- 9.282 The evidence of displacement by golden plover is varied and mostly relates to displacement of breeding territories. This has been found to occur in some locales (Samson, 2016) but other sites have persistently maintained their golden plover populations over much longer periods (Fielding, 2013) or no effects were identified (Douglas, 2011).
- 9.283 It is, therefore, considered likely that there will be a reduction in breeding activity within the proposed development site with possible disturbance / displacement to at least one / possibly two probable breeding pairs. In terms of the NHZ population of golden plover (3,125 breeding pairs (Wilson, 2015)), there would be **no significant operational effects**.
- 9.284 There was no recorded use of the proposed development site during the migration periods. Habitat will remain available and potentially enhanced as a result of habitat management but there may be some localised displacement associated with a mobile species which is stopping off on suitable habitat. There is suitable habitat in the surrounding area such that the displacement effect will be limited. As a result, there would be **no significant operational effects** because of the small number of birds affected from a much wider population.
- 9.285 **Table 9-28** shows the estimated collision risk for golden plover. The collision risk model has predicted the loss of significantly less than one bird over the lifetime of the proposed development. Therefore, there will be **no significant operational effects** on golden plover as a result of collisions with the proposed development when compared to the wider population of the NHZ (3,125 breeding pairs (Wilson, 2015)). Confidence in these assessments for this species is considered near certain.

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 30 years
Golden plover	0.008	120.438	0.24

Table 9-28: Collision risk estimate for Golden Plover



Dunlin

- 9.286 The breeding population of dunlin is one of the qualifying features of the Caithness and Sutherland Peatlands SPA / Ramsar (located immediately adjacent to the west of the proposed development). The breeding population of dunlin also forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (located immediately adjacent to the west of the proposed development) and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development at its closest point). The breeding population is also one of the qualifying features of the East Halladale SSSI (located approximately 1.50km east of the proposed development at its closest point).
- 9.287 This species has been observed transiting the proposed development site below collision risk height, together with individuals on the ground.
- 9.288 No confirmed territories were identified within the proposed development site, with one probable territory in the survey buffer to the west in 2020, and one probable territory (in the survey buffer to the west) and one possible territory (within the proposed development site, to the east of turbines 5 and 6) in 2021 (**Figures 9.3** and **9.4** refer).
- 9.289 Given the evidence of use of wind farms by breeding dunlin, it seems likely that any displacement or barrier effect is limited. This will result in a **not significant** effect.
- 9.290 **Table 9-29** shows the estimated collision risk for dunlin. The collision risk model has predicted the loss of significantly less than one bird over the lifetime of the proposed development. Therefore, there will be **no significant operational effects** on dunlin as a result of collisions with the proposed development when compared to the wider population of the NHZ (2,196 breeding pairs (Wilson, 2015)). Confidence in these assessments for this species is considered near certain.

Table 9-29: Collision risk estimate for Dunlin

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 30 years
Dunlin	0.006	181.818	0.18

Hen Harrier

- 9.291 The breeding population of hen harrier is a qualifying feature of the Caithness and Sutherland Peatlands SPA (located immediately adjacent to the west of the proposed development). The breeding population of hen harrier forms part of the breeding bird assemblage which is one of the qualifying features of West Halladale SSSI (located immediately adjacent to the west of the proposed development).
- 9.292 This species has been observed transiting the proposed development site below and at collision risk height.
- 9.293 There is a considerable body of evidence to show that disturbance / displacement effects and barrier effects are very limited (e.g. Haworth & Fielding, 2013; Wilson *et al.*, 2015). As such, it is considered there would be **no significant operational effects**.



9.294 **Table 9-30** shows the estimated collision risk for hen harrier. The collision risk model has predicted the loss of significantly less than one bird over the lifetime of the proposed development. Therefore, there will be **no significant operational effects** on hen harrier as a result of collisions with the proposed development when compared to the wider population of the NHZ (38 breeding pairs (Wilson, 2015)). Confidence in these assessments for these species is considered near certain.

Species	Annual Collision Risk	No. of years per collision	No. of collisions over 30 years
Hen Harrier	0.001	2,000	0.03

Table 9-30: Collision risk estimate for Hen Harrier

CUMULATIVE ASSESSMENT

- 9.295 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.
- 9.296 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).
- 9.297 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.
- 9.298 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 NatureScot, that implementation of mitigation and compensation measures will reduce the overall impacts.

- 9.299 A search was carried out for wind farms with two or more turbines with tip heights greater than 50m¹ within NHZ 5 The Peatlands of Caithness and Sutherland. In addition data was provided by NatureScot from the cumulative database they maintain for this area.
- 9.300 **Table 9-31** shows the results of that search. Records of refusals more than two years old and projects which have been scoped more than five years ago have been omitted.



¹ These parameters were selected because smaller developments are less likely to have quantitative data or may not even have an associated Environmental Statement or EIA Report.

Site Name	Status	Listed Turbines	Distance and approximate direction from proposed development (km)	Information Available
Strathy North	Operational	33	c. 4.47km to the south west at its closest point	CRM information for hen harrier, golden eagle, golden plover, dunlin, and greylag goose
Bettyhill / Bettyhill Extension	Operational / Scoped	2/7	c. 12.20km to the west at its closest point	CRM information for hen harrier
Baillie	Operational	21	c. 12.57km to the east north east at its closest point	No CRM data available
Achlachan / Achlachan 2	Operational / Consented	5/3	c. 25.89km / c. 26.21km to the south east at its closest point	CRM information for golden plover
Causeymire	Operational	21	c. 26.49km to the south east at its closest point	No CRM data available
Bad a Cheo	Operational	13	c. 27.96km to the south-east at its closest point	CRM information for whooper swan, greylag goose and golden plover
Halsary	Operational	15	c. 28.58km to the east south east at its closest point	CRM information for greylag goose, hen harrier, whooper swan and golden plover
Boulfruich	Operational	15	c. 34.31km to the south east at its closest point	No CRM data available
Camster	Operational	25	c. 36.56km to the south east at its closest point	CRM information for hen harrier
Gordonbush	Operational	35	c. 40.40km to the south south	CRM information for golden plover and hen harrier

Table 9-31: Overview of Wind Farm Developments in NHZ 5 Peatlands of Caithness and Sutherland



			west at its closest point	
Achairn	Operational	3	c. 40.92km to the east south east at its closest point	CRM information for hen harrier
Burn of Whilk	Operational	9	c. 42.23km to the south east at its closest point	CRM information for hen harrier
Lairg	Operational	3	c. 59.41km to the south west at its closest point	CRM information for hen harrier
Achany	Operational	19	c. 63.99km to the south west at its closest point	CRM information for golden plover and hen harrier
Strathy Wood	Consented	13	c. 4.60km to the south west at its closest point	CRM information for hen harrier, golden eagle, greylag goose and pink-footed goose
Strathy South	Consented	35	c. 7.95km to the south west at its closest point	CRM information for golden eagle and hen harrier
Limekiln S36 Variation	Consented	19	c. 7.46km to the east at its closest point	No CRM data available
Limekiln Extension	Consented	5	c. 9.20km to the east at its closest point	No CRM data available
Golticlay	Consented	19	c. 35.27km to the south east at its closest point	CRM information for hen harrier, pink-footed goose, greylag goose and golden plover
Hill of Lychrobbie	Consented	3	c. 37.94km to the south east at its closest point	CRM information for golden plover
Creag Riabhach	Consented	21	c. 43.29km to the south west at its closest point	CRM information for pink- footed goose and golden eagle



Strath Tirry	Consented	4	c. 51.08km to the south west at its closest point	CRM information for greylag goose, whooper swan and pink-footed goose
Braemore	Consented	18	c. 64.25km to the south west at its closest point	CRM information for golden plover and hen harrier
Dounreay Tri Floating Wind Demonstrator	Consented	2	c. 12.48km to the north at its closest point	CRM information for gannet, great skua, kittiwake, herring gull, great black-backed gull and Arctic tern
Armadale	In Planning	12	c. 6.64km to the west at its closest point	CRM information for greylag goose, whooper swan, golden plover, curlew, greenshank, golden eagle, hen harrier, white-tailed, eagle, merlin and peregrine
Cairnmore	In Planning	8	c. 16.71km to the north east at its closest point	No CRM data available
Tormsdale	In Planning	12	c. 24.49km to the south east at its closest point	CRM information for greylag goose, pink-footed goose, whooper swan, lapwing, golden plover, curlew and hen harrier
Chleansaid	In Planning	20	c. 45.39km to the south west at its closest point	No CRM data available
Melvich Wind Energy Hub	Scoping	13	Immediately to the north of the proposed Kirkton Energy Park	No CRM data available
Pentland Floating Offshore Wind Farm	Scoping	6 - 10	c. 12.48km to the north north east at its closest point	No CRM data available
South Shebster	Refused	5	c. 11.28km to the east at its closest point	No CRM data available



Borrowstone Mains	Refused	10	c. 12.30km to the north east at	No CRM data available
			its closest point	

- 9.301 **Table 9-32** provides a summary of the results of the cumulative collision assessment. Collision risk estimates were adjusted where avoidance rates had been changed subsequent to the rate being estimated; unpublished SNH data (June 2022) was also used to locate estimates which were not available. This includes an amendment made to the estimate of collision risk at Camster Wind Farm for hen harrier.
- 9.302 The lifetime of the proposed development is 30 years. The vast majority of the other developments considered have a lifetime of 25 years. However, consideration of cumulative impacts has been assessed on an annual basis and so project lifetime is not considered.



Wind Farm	Status	Greylag Goose	Pink-footed Goose	Curlew	Lapwing	Golden Eagle	Whooper Swan	Golden Plover	Dunlin	Hen Harrier
Strathy North	Operational	0.127 (br) 0.23 (non-br)	0.00			0.039	Insufficient data	0.94 (theoretical)		0.38
Bettyhill	Operational	0.01	0.40			0.00	0.00			0.01
Achlachan	Operational							c. 16 birds per year	0.00	
Bad a Cheo	Operational	0.17					0.08	0.51		
Halsary	Operational	<u>0.22</u>	0.00			0.00	0.06	0.00	0.00	0.02
Camster	Operational	0.70	0.00			0.00	0.00	0.00 0.00		0.06
Gordonbush	Operational	0.00	0.00			0.07	0.00	1.27	0.00	0.00
Achairn	Operational	0.06	0.00			0.00	0.00	0.00		0.00
Burn of Whilk	Operational	0.08	0.00			0.01	0.00	0.00	0.00	0.03
Lairg	Operational	0.00	0.00			0.01	0.01	0.00	0.00	0.00
Achany	Operational	0.00	0.00			0.00	0.00	0.00	0.00	0.00

Table 9-32: Results of Cumulative Collision Risk Review (per year unless otherwise stated)



Achlachan 2	Under Construction	0.56 (Aut) *	0.33 (non-br) *		0.14 (Aut) 0.42 (non- br) *			17.03 (non- br) *		
Strathy Wood	Approved	0.015	0.005			0.008		0.00		0.06
Strathy South	Approved	0.27	1.33			0.01	1.13	0.00		0.020 (sum)
										0.008 (win)
Golticlay	Approved	2.38 (non-br)	2.73 (non-br)				0.08	0.05		0.05
			0.77 (br)							
Creag Riabhach	Approved		0.78			0.004				
Strath Tirry	Approved	0.02 (br) 0.87 (non-br)	1.2				0.02			
Braemore	Approved	0.8	0.29			0.00	0.00	0.00	0.00	0.07
Hill of Lychrobbie	Approved	0.16	0.01				0.13	3.38		
Armadale	In Planning	0.449		0.050		0.012	0.009	0.051		0.001

Tormsdale	In Planning	0.10	0.005	0.053	0.640		0.02	49.98		0.20
Kirkton	Scoping	0.203	0.029	0.031	0.015	0.008	0.006	0.008	0.006	0.001

* Extrapolated data from Achlachan observations

Abbreviations:

br – breeding season; non-br – non-breeding season; Aut – Autumn; sum – summer; win - winter



9.303 **Table 9-33** provides the cumulative annual estimates for the species considered. Numbers have been rounded to three decimal places where appropriate.

	Greylag Goose	Pink- footed Goose	Curlew	Lapwing	Golden Eagle	Whooper Swan	Golden Plover	Dunlin	Hen Harrier
Operational and Under Construction Sites									
Annual Collision Risk	2.157	0.73	0	0.56	0.129	0.15	35.750	0	0.5
Annual Collision Risk including proposed development	2.36	0.759	0.031	0.575	0.137	0.156	35.758	0.006	0.501
Estimate of 30 year loss, including proposed development	70.8	22.77	0.93	17.25	4.11	4.68	1,072.74	0.18	15.03
Sites in Planning									
In Planning	5.064	7.12	0.103	0.64	0.034	1.389	53.461 (worst case) 4.343 (best case following implement ation of HMP at Tormsdale)	0	0.409
Number lost over 30 years	151.92	213.6	3.09	19.2	1.02	41.67	1,603.83 (worst case) 130.29 (best case)	0	12.27

Table 9-33: Cumulative Collision Risk Estimates


Greylag Goose

- 9.304 Breeding populations of greylag goose are qualifying features of the Caithness and Sutherland Peatlands Ramsar (the majority of which lies immediately adjacent to the western boundary of the proposed development site), and wintering populations are a qualifying feature of the Caithness Lochs SPA (located approximately 14.89km to the east of the proposed development site at its closest point). Greylag goose is also listed as a qualifying species of West Halladale SSSI (the majority of which is located immediately adjacent to the western boundary of the proposed development), East Halladale SSSI (located approximately 1.50km to the east of the proposed development at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).
- 9.305 The winter peak mean estimate of the SPA is 7,190 individuals. Based on this population estimate, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the SPA population. Confidence in this assessment is considered near certain. No Ramsar population estimate exists. No SSSI population estimate exists.
- 9.306 No NHZ population exists; however, a survey carried out in 2008/09 of Scottish greylag goose populations suggested that the north west Scotland breeding population was 34,500 (Mitchell *et al.*, 2011). This does not take account of the Icelandic population which also winter in Scotland.
- 9.307 Based on this population estimate, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the county or regional populations. Confidence in this assessment is considered near certain.

Pink-footed Goose

9.308 The NHZ peak count of wintering pink-footed goose is estimated at 2,070 (Wilson, 2015). Based on this, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the county or regional populations. Confidence in this assessment is considered near certain.

Curlew

- 9.309 Curlew is listed as a qualifying species of Lochan Buidhe Mires SSSI, located approximately 6.37km to the west of the proposed development site at its closest point. No SSSI population estimate exists.
- 9.310 The NHZ population is estimated at 1,737 pairs (Wilson, 2015) although this species is undergoing a decline in population. Based on this, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the county or regional populations. Confidence in this assessment is considered near certain.

Lapwing

9.311 No NHZ population estimate exists. The Scottish population of breeding lapwing is estimated at 71,500 – 105,600 (Forrester, 2007), although is likely to have declined since that estimate was made. Lapwing is widely distributed across Caithness and Sutherland. Based on this, the cumulative impact from collision risk would not give rise to a significant cumulative operational



effect on the county or regional populations. Confidence in this assessment is considered near certain.

Golden Eagle

- 9.312 The breeding population of golden eagle is one of the qualifying features of the Caithness and Sutherland Peatlands SPA and West Halladale SSSI (the majority of which lies immediately adjacent to the western boundary of the proposed development), East Halladale SSSI (located approximately 1.50km to the east of the proposed development site at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).
- 9.313 The most recent population estimate of the SPA is 5 pairs (SNH, undated a). There are no population estimates for any of the SSSIs. Based on the SPA population estimate, the addition of the proposed development to the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the SPA population because the magnitude of the additional collision risk from this wind farm is so limited. Confidence in this assessment is considered near certain.
- 9.314 The NHZ population is estimated at 18 occupied breeding territories (Wilson, 2015). Based on this, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the NHZ population. Confidence in this assessment is considered near certain.

Whooper Swan

- 9.315 Wintering populations of whooper swan are a qualifying feature of the Caithness Lochs SPA (located approximately 14.89km to the east of the proposed development site at its closest point).
- 9.316 The winter peak mean estimate of the SPA is 240 individuals. Based on this population estimate, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the SPA population. Confidence in this assessment is considered near certain.
- 9.317 The estimated peak abundance of the NHZ population is 190 individuals (Wilson, 2015). Based on this, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the NHZ population. Confidence in this assessment is considered near certain.

Golden Plover

- 9.318 Breeding populations of golden plover are a qualifying feature of the Caithness and Sutherland Peatlands SPA and the West Halladale SSSI (the majority of which lies immediately adjacent to the western boundary of the proposed development), East Halladale SSSI (located approximately located approximately 1.50km to the east of the proposed development site at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).
- 9.319 There is no population estimate for any of the SSSIs. The most recent population estimate of the SPA is 1,922 pairs (SNH, undated a). Based on the SPA population estimate, the cumulative impact



from collision risk would **not give rise to a significant cumulative operational effect** on the SPA population. Confidence in this assessment is considered near certain.

- 9.320 The NHZ population is estimated at 3,125 breeding pairs (Wilson, 2015). Based on this, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the NHZ population. Confidence in this assessment is considered near certain.
- 9.321 The predicted cumulative collision risk for golden plover is relatively high at approximately 36 birds a year, although it is based upon a relatively large breeding population (3,125 breeding pairs (Wilson, 2015)). Large numbers of golden plover can also be found in the region (Caithness and Sutherland) during winter and on migration, and the collision risk model used can over-estimate the collision risk for migratory birds, which do not form part of the SPA population.
- 9.322 The majority of the collision risk came from Achlachan and Achlachan II (located approximately 26km to the south east); NatureScot provide a consolidated estimate for these sites of 27.2, lower than the estimate provided here. For at least one of those sites the estimate is for non-breeding birds, which suggests there may be migration effects occurring and the impacts would not be borne by the SPA population.

Dunlin

- 9.323 Breeding populations of dunlin are a qualifying feature of the Caithness and Sutherland Peatlands SPA / Ramsar and the West Halladale SSSI (the majority of which lies immediately adjacent to the western boundary of the proposed development), East Halladale SSSI (located approximately located approximately 1.50km to the east of the proposed development site at its closest point), and Lochan Buidhe Mires SSSI (located approximately 6.37km to the west of the proposed development site at its closest point).
- 9.324 There is no population estimate for the Ramsar or any of the SSSIs. The most recent population estimate of the SPA is 1,860 pairs (SNH, undated a). Based on the SPA population estimate, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the SPA population.
- 9.325 The NHZ population is estimated at 2,196 breeding pairs (Wilson, 2015). Based on this, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the NHZ population. Confidence in these assessments for this species is considered near certain.

Hen Harrier

- 9.326 Breeding populations of hen harrier are a qualifying feature of the Caithness and Sutherland Peatlands SPA and the West Halladale SSSI (the majority of which lies immediately adjacent to the western boundary of the proposed development).
- 9.327 There is no population estimate for either of the SSSIs. The most recent population estimate of the SPA is 14 pairs (SNH, undated a). Based on the SPA population estimate and modelling which has been carried out previously for this population, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the SPA population.



9.328 The NHZ population is estimated at 38 breeding pairs (Wilson, 2015). Based on this, the cumulative impact from collision risk would **not give rise to a significant cumulative operational effect** on the NHZ population. Confidence in these assessments for this species is considered near certain.

SUMMARY OF RESIDUAL EFFECTS

9.329 The potential impacts of the proposed development on ornithological receptors found within and in close vicinity to the proposed development site have been assessed. Taking into account the successful implementation of the mitigation measures contained within the CEMP and HMP, there will be **no significant residual effects** in terms of the EIA Regulations.

CONCLUSIONS

- 9.330 The baseline populations of the proposed development site have been described and assessed to identify important ornithological receptors. Proposed mitigation measures through the CEMP and HMP were identified to manage the potential impacts of the proposed development on those ornithological receptors during construction and operation.
- 9.331 The residual effects, taking into account construction and operation, were then assessed to establish if they would have significant effects on the ornithological receptors and a cumulative assessment was carried out to identify any regional level impacts which could become significant as a result of the proposed development.
- 9.332 No significant residual effects were identified and it is therefore concluded that the proposed development could proceed without having an adverse effect on the ornithological receptors on and around the proposed development.



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