Chapter 8: Ornithology

Creag Riabhach Wind Farm Extension

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Contents

8 Ornithology

8.1 Introduction

The potential effects of the Creag Riabhach Wind Farm Extension, hereafter referred to as the 'proposed development', during construction, operation and maintenance, and decommissioning on Ornithology receptors are assessed in this chapter. This chapter also includes a review of the potential cumulative effects with other relevant projects.

This assessment, survey works (desk study), and wind farm bird collision risk modelling have been undertaken by Caledonian Conservation Ltd, providing independent and objective reporting based upon sound scientific data collection and analysis in accordance with the best practice guidance and standards of the Chartered Institute of Ecology and Environmental Management (CIEEM). Caledonian Conservation Ltd have contributed to the assessment with the following surveys and their associated reports, as detailed in **Table 8.1**.

Further competency details of the Project Team, including lead authors for each chapter, are provided in **Chapter 1: Introduction** of this Environmental Impact Assessment (EIA) Report.

Table 8.1 below provides a list of the supporting studies which relate to the Terrestrial Ecology impact assessment. All supporting studies are appended to this EIAR.

Table 8.1: Supporting Studies

Details of study	Locations of supporting studies
Ornithology Survey Summary and Wind Farm Bird Collision Risk Modelling	**Technical Appendix 8.1 (Volume 4)**
Creag Riabhach Wind Farm Environmental Statement. Technical Appendix 6: Ornithology. (Creag Riabhach Wind Farm Ltd., 2013)[1]	**Technical Appendix 8.1; Annex (Volume 4)**
Confidential information relating to sensitive species	**Confidential Annex (Volume 4)**
Biodiversity Enhancement and Restoration Plan Technical Appendix	**Technical Appendix 6.2 (Volume 4)**

8.2 Legislation, Policy, and Guidance

The following relevant legislation and guidance relating to Ornithology was used in the preparation of this chapter:

[1] Creag Riabhach Wind Farm Ltd. 2013. *Creag Riabhach Wind Farm Environmental Statement. Technical Appendix 6: Ornithology*. Caledonian Conservation Ltd. Bridge of Allan.

8.2.1 Legislation

- *Directive 2009/147/EC on the Conservation of Wild Birds (the codified version of Council Directive 79/409/EEC as amended) the (Birds Directive)* - lists bird species that are of conservation importance at a European level. One of the main provisions of the Directive is the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable Annex I bird species, as well as for all regularly occurring migratory species. Domestic legislation continues to be aligned after Scotland left the European Union (EU) with the UK through the UK Withdrawal from the EU (Continuity) (Scotland) Act 2021;
- *European Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (the Habitats Directive)* - aims to promote the maintenance of biodiversity, and as such identifies species and habitats for which core areas must be designated as Special Areas of Conservation (SACs). Transposed into UK law by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland). Domestic legislation continues to be aligned after Scotland left the European Union (EU) with the UK through the UK Withdrawal from the EU (Continuity) (Scotland) Act 2021;
- *The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations)* – transpose the Habitats Directive into UK law;
- *Wildlife and Countryside Act 1981 (as amended in Scotland) (WCA)* - provides protection to species and habitats including all wild birds, enhanced protection for species listed on Schedules 1, 1A, and A1, and protection for habitats and species of national importance through the designation of Sites of Special Scientific Interest (SSSIs),
- *Wildlife and Natural Environment (as amended in Scotland) Act 2011 (as amended) (WANE*) – amends other pieces of legislation including the WCA and PBA, and creates a mechanism for establishing a code of practice with regards to non-native, invasive species. (Note, in Scotland there is not a defined list of invasive non-native species – instead the meaning of non-native range is defined, and it as an offence to cause these to be present outwith their native range.);
- *Nature Conservation (Scotland) Act 2004 (as amended) (NCSA)* – places a duty on all public authorities to consider biodiversity in their work, requires Scottish Ministers to produce a biodiversity strategy and list of species and habitats of principal importance for biodiversity conservation in Scotland, and strengthens legislation protecting SSSIs;
- *Scottish Biodiversity List* - The Scottish Biodiversity List (SBL) is a list of habitats, animals and plants that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. It was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) 2004 Act for the conservation of biodiversity, and supersedes the UK Biodiversity Action Plan. Public bodies must consider SBL species when reporting on their 'Biodiversity Duty' (as defined and required by the Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011); and
- *Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017* - implements Directive 2001/92/EU in relation to the construction and operation of generating stations and their impact on the environment.

8.2.2 Policy

- *National Planning Framework 4 (NPF4)* - The latest National Planning Framework emphasises the importance of protecting biodiversity, reversing biodiversity loss, delivering positive effects from development, and strengthening nature networks (Scottish Government, 2023)[2]. As part of this, development proposals are expected to contribute towards the enhancement of biodiversity, including restoration of degraded habitats, as well as restoring connections between nature networks.;
- *Scottish Biodiversity Strategy 2022 to 2045. Tackling the Nature Emergency in Scotland.* (Scottish Government, 2022)[3] – Updated biodiversity strategy, notably aiming to halt and reverse biodiversity loss in Scotland;
- *Scottish Biodiversity Strategy Post-2020: A Statement of Intent, 2020* - Sets the direction for a new biodiversity strategy which will respond to the increased urgency for action to tackle the twin challenges of biodiversity loss and climate change;
- *Scotland's Biodiversity: It's in Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland* (Scottish Executive, 2004)[4];
- *2020 Challenge for Scotland's Biodiversity. A strategy for the conservation and enhancement of biodiversity in Scotland* (Scottish Government, 2013)[5];
- *The UK Biodiversity Action Plan (UKBAP)* – most recently updated in 2007, superseded by the 'UK post-2010 Biodiversity Framework' and devolved under the NCSA, the UKBAP lists of priority species and habitats are still of value to policy makers;
- *Scottish Biodiversity List (SBL),* (NatureScot, 2020a)[6] - This is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland and helps public bodies apply their biodiversity duty, superseding the UKBAP;
- The proposed scheme falls within the boundaries of the *Caithness and Sutherland Local Development Plan (LDP)(2018)*. Chapter 2, Strategy and Policies, considers planning policies relevant to the safeguarding of areas of high-quality nature conservation value, and the protection and enhancement of green networks and green spaces;
- *Highland Nature Biodiversity Action Plan 2021 – 2026* – This Local Biodiversity Action Plan (LBAP) defines nature conservation priorities, actions and targets for the Highlands.

[2] Scottish Government, 2023. *National Planning Policy 4.* Scottish Government, Edinburgh.

[3] Scottish Government, 2022. *Scottish Biodiversity Strategy to 2045. Tackling the Nature Emergency in Scotland.* Scottish Government, Edinburgh.

[4] Scottish Executive. 2004. *Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland.* Scottish Executive, St Andrew's House, Edinburgh.

[5] Scottish Government. 2013. *2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland.* Scottish Government, Edinburgh.

[6] NatureScot. 2020. *Scottish Biodiversity List*. Available online at: https://www.nature.scot/doc/scottish-biodiversity-list.

- *Highland-Wide Local Development Plan. Policy 58 – Protected Species* (2012) - The policy states that where protected species are present the council will require surveys to be carried out to establish presence and if necessary, mitigation will need to be implemented to avoid or minimise impacts on species; and
- *Highland-Wide Local Development Plan. Policy 59 – Other Important Species* (2012): The policy states that species listed under the Habitats Directive, UK and LBAP and the SBL will need to be considered in terms of adverse effects from proposals.

8.2.3 Guidance

- *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018)[7]*;*
- *A Handbook on Environmental Impact Assessment, Version 5 (Historic Environment Scotland and SNH, 2018)*[8] *– Guidance to be followed when undertaking EIA published by SNH (now NatureScot) and HES;*
- *Birds of Conservation Concern - The UK Birds of Conservation Concern (BoCC) is a periodic national review assessing the population and trends for UK breeding bird species. It uses a traffic light system to indicate an increasing level of conservation concern. Species that have a declining range and/or population, or that are vulnerable to population effects due to their small population size, are Red- or Amber-listed, depending on the extent of the decline or vulnerability, while those which are stable, increasing, or experiencing only small declines, are Green-listed. The most recent review (BoCC 5) was published in December 2021 (Stanbury et al., 2021)*[9]*;*
- *Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities* (SNH, 2010)[10];
- *Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms* (SNH, 2017)[11];
- *Bird Monitoring Methods* (Gilbert *et al.*, 1998)[12]*;*

[7] CIEEM. 2018. *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.2 – Updated April 2022.* Chartered Institute of Ecology and Environmental Management, Winchester.

[8] Historic Environment Scotland & Scottish Natural Heritage. 2018. *A Handbook on Environmental Impact Assessment, 5th edition*. SNH.

[9] Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. & Win, I. 2021 The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds* **114**, 723-747.

[10] SNH. 2010. *Survey Methods for Use in assessing the Impacts of Onshore Wind farms on Bird Communities. November 2005 (revised December 2010).* SNH, Battleby.

[11] SNH. 2017. *Recommended bird survey methods to inform impact assessment of onshore wind farms. March 2017. Version 2*. SNH, Inverness.

[12] Gilbert, G., Gibbons, D.W. and Evans, J. 1998. *Bird Monitoring Methods*. RSPB, Sandy.

- *Raptors: A Field Guide to Survey and Monitoring* (Hardey *et al.*, 2013)[13]*;*
- *Barn Owl Survey Techniques* (Barn Owl Trust, 2001)[14]*;*
- *Barn Owl Conservation Handbook* (Barn Owl Trust, 2012)[15]*;*
- *Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas* (SNH, 2018)[16]*;*
- *Monitoring the Impact of Onshore Wind Farms on Birds* (SNH, 2009)[17]*;*
- *The Highland Council Supplementary Guidance. Highland's Statutory Protected Species* (2013);
- *Guidance on the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000*;
- *Guidance on Electricity Works (Environmental Impact Assessment) (Scotland) Amendment Regulations 2008*;
- *Assessing the Cumulative Impact of Onshore Wind Energy Developments* (NatureScot, 2021)[18];
- *Guidance Note: Windfarms and Birds: Calculating a theoretical collision risk assuming no avoiding action.* (Band *et al.*, 2007)[19];
- *Guidance Note: Windfarms and Birds: Calculating a theoretical collision risk assuming no avoiding action.* (SNH, 2000)[20];
- *Wind farm impacts on birds – Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model.* (NatureScot, 2018)[21];
- *An updated literature review of disturbance distances of selected bird species. NatureScot Report 1283.* (Goodship & Furness, 2022)[22];
- *Assessing Connectivity with Special Protection Areas (SPAs)* (SNH, 2016)[23];
- *Scottish Government Planning Advice Note 1/2013: Environmental Impact Assessment* – Scottish Government Planning Advice Note regarding Environmental Impact Assessment;

[13] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. 2013. *Raptors: a field guide to survey and monitoring*, 3rd edition. SNH, Inverness.

[14] Barn Owl Trust. 2001. *Survey Techniques. Leaflet No. 8*. The Barn Owl Trust, Ashburton.

[15] Barn Owl Trust. 2012. *Barn Owl Conservation Handbook*. Pelagic Publishing, Exeter.

[16] SNH. 2018. *Guidance – Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas.* SNH.

[17] SNH 2009. *Monitoring the impact of onshore wind farms on birds.* SNH.

[18] NatureScot. 2021. *NatureScot. Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments*. NatureScot.

[19] Band, W., Madders, M. & Whitfield, D.P. 2007. Developing field and analytical methods to assess avian collision risk at wind farms. In de Lucas, M., Janss, G. and Ferrer, M. (eds.) *Birds and Wind Power*. Quercus.

[20] Scottish Natural Heritage (SNH). 2000. *Guidance Note: Windfarms and Birds: Calculating a theoretical collision risk assuming no avoiding action.* SNH, Battleby.

[21] NatureScot. 2018. *Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model. September 2018 v2.* NatureScot.

[22] Goodship, N.M. & Furness, R.W. (MacArthur Green). 2022. *An updated literature review of disturbance distances of selected bird species. NatureScot Report 1283.* NatureScot.

[23] SNH. 2016. *Assessing Connectivity with Special Protection Areas (SPAs). Version 3 – June 2016.* SNH.

- Scottish Planning Circular 1/2017 guidance on the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017) - Gives guidance on the 2017 Regulations which transpose the Environmental Impact Assessment (EIA) Directive into the Scottish planning system; and
- *Good practice During Wind Farm Construction* (Scottish Renewables *et al.,* 2019)[24].

8.3 Scoping and Consultation

Scoping and consultation have been ongoing throughout the EIA process and have played an important part in ensuring the scope of the baseline characterisation and impact assessment are appropriate with respect to the proposed development, given the requirements of the regulators and their advisors.

Relevant comments from the EIA Scoping Opinion and other consultation specific to Ornithology provided by Scottish Government, The Highland Council (THC), NatureScot (NS), and the Royal Society for the Protection of Birds (RSPB), are summarised in Table 8.2 below, which provides a high-level response on how these comments have been addressed within this EIA.

Table 8.2: Summary of Consultation Responses Specific to Ornithology

Consultee	Comment / Issue Raised	Response
Scoping Opinion (26 July 2022)		
Scottish Government	Development is close to Caithness and Sutherland Peatlands SPA / RAMSAR site. Assessments should be carried out to determine the impacts of the proposed development on these areas and NS should be consulted further to mitigate these impacts.	All relevant designated sites have been considered in this assessment. NS was consulted and provided with a detailed consultation document detailing our proposed approach, which was agreed to be acceptable.
Scottish Government	EIA report should include a baseline for ecology and ornithology, including species and habitats.	Baseline for ornithological features is provided in this assessment, following the approach agreed with NS.
The Highland Council (THC)	The presence of protected species such as Schedule 1 Birds or European Protected Species must be included and considered as part of the planning application process.	Schedule 1 species and European Protected Species have been included in this assessment.

[24] Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency & Forestry Commission Scotland. 2019. *Good Practice during Wind Farm Construction, 4th edition.* Good Practice during wind farm construction - 4th Ed. Scottish Renewables.

Consultee	Comment / Issue Raised	Response
THC	An assessment of the impacts to birds through collision, disturbance and displacement from foraging/breeding/roosting habitat will be required for both the Proposed Development site and cumulatively with other proposals.	Included in this assessment.
THC	The EIAR should be clear on the survey methods and any deviations from guidance on ornithology matters.	Survey methods are summarised here and presented in detail in **Technical Appendix 8.1**. Deviation from guidance is described and has been agreed with NS.
NS	Indicated that the proposed development is close to Caithness and Sutherland Peatlands SPA/RAMSAR site, and that impacts on qualifying features would need to be considered in the context of the conservation objectives of the site.	Included in this assessment.
NS	Impacts to wider countryside species (i.e., those not connected to a protected area) should be assessed against the relevant Natural Heritage Zone (NHZ).	Included in this assessment.
NS	Indicated that cumulative impacts on birds must be considered.	Included in this assessment.
RSPB	Highlighted that the proposed development is in close proximity to various designated sites, including Caithness and Sutherland Peatlands SPA/RAMSAR, as well as Cnoc an Alaskie SSSI, and Ben Klibreck SSSI. Indicated that these must be considered in the assessment, and that the EIAR must include sufficient information to inform an appropriate assessment.	Included in this assessment.
RSPB	Indicated that there are birds included on the Red and Amber lists of BoCC, including black grouse, skylark, and snipe, are present in the area and could be affected by the proposed development.	Included in this assessment.
RSPB	Noted that existing datasets collected during pre-application surveys (2012-2013), pre-construction surveys (2019-2020), and operational phase monitoring (2021 onwards) are considered adequate to inform Ornithology Impact Assessment for the extension. Noted that the survey data used for the assessment for the Consented Scheme is out of date. However, stated that since the consented scheme is currently under construction and due	A summary of survey methodologies is included in this assessment, while full details are provided in **Technical Appendix 8.1**.

Consultee	Comment / Issue Raised	Response
	to the extension turbines' proximity to current construction areas, it is likely that any new data collection at this time would be limited by the construction activity. Therefore, RSPB agreed that data collected for the pre-construction surveys and operational phase monitoring surveys could be used to inform an updated assessment, as long as they have included Vantage Point and Breeding Bird Surveys, as well as specific monitoring of woodland grouse, waders, divers, raptors and eagles, as per NS Guidance; and fully cover the extension area and standard buffers.	
RSPB	A robust cumulative and in-combination 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, including the Lairg to Loch Buidhe overhead line and the Creag Riabhach grid connection should also be included.	Cumulative impacts have been considered in this assessment.
RSPB	The EIA report should include a clear description of the mitigation measures that are proposed to avoid or minimise potential adverse impacts, and an assessment of any residual impact following the deployment of these measures.	Mitigation measures have been described in this assessment, and residual impacts have been included.
RSPB	Indicated a draft or outline Habitat Management Plan (HMP) should be prepared as part of the EIA and submitted with the application. This should have sufficient detail to allow consideration of its feasibility and effectiveness in providing any proposed mitigation and/or compensation and enhancement. The HMP, or other document, should also include information on post-construction monitoring of birds, including reporting of collision mortality.	Details of proposed habitat enhancements have been included in this EIA report.
RSPB	Drew attention to NPF4's commitment to deliver positive effects for biodiversity through development. Draft Policy 3 states that, '*Development proposals for national, major and*	Details of proposed habitat enhancements have been included in this EIA report, which has been prepared with consideration to NPF4.

Consultee	Comment / Issue Raised	Response
	of EIA development … should only be supported where it can be demonstrated that the proposal will conserve and enhance biodiversity, including nature networks within and adjacent to the site, so that they are in a demonstrably better state than without intervention, including through future management.'	
RSPB	Indicated that any compensatory tree planting would need to be planned carefully and potential locations considered holistically within the landscape. Any woodland planting should avoid areas of deep peat over 50 cm and avoid areas which are important for birds of open habitats such as waders. Breeding bird surveys should be undertaken on any the selected site to ensure that important areas such as these are avoided.	Any compensatory planting will be undertaken within relevant legal frameworks and following best practice guidance.
Other Correspondence		
NS	Indicated that baseline bird data from original Creag Riabhach Wind Farm (CRWF) would be adequate to inform the assessment for the proposed development. (E-mail from Alexander Macdonald (NS) to Ron Shanks dated 17 June 2021.)	Acknowledged.
NS	Responded to detailed Consultation document (issued on 13 November 2021) which set out approach to ecology and ornithology assessment, including use of previously collected data without need for new surveys. Confirmed agreement with approach to assessment. (E-mail from Alexander Macdonald (NS) to Chris Cathrine dated 02 December 2021)	Acknowledged.

8.4 Baseline Survey Methodology

This section describes the location of the survey area and provides an overview of the methods used to carry out the Ornithology desk study. The results from all surveys are used in order to provide the baseline descriptions for the assessment. Further details of survey methods and results are presented in **Technical Appendix 8.1** and associated annexes.

8.4.1 Study Area

The focus of the impact assessment is the potential effects on Ornithology arising from the proposed development.

The proposed development boundary, layout, and Vantage Point locations, and survey areas used for the original CRWF application are shown in **Figures 8.1** and **8.2**.

The guidance for Ecological Impact Assessment (EcIA) require that the surveyed site includes all areas where significant effects could occur throughout the life of the project. The 'zone of influence' of the proposed activities upon different habitats and species varies greatly. This is taken into account in the individual assessments.

The desk study encompasses the proposed development site, plus appropriate buffers for statutory international designated sites (up to 20km), eagles (up to 6km), statutory national designated sites (up to 5km) and a 2km buffer was applied for all other species records.

8.4.2 Desk Study

A detailed desk study was undertaken of the existing literature and data relating to ornithology. The desk-based study was undertaken between May 2022 and January 2023.

Schedule 1 raptors represent a particularly important sensitivity, and these species may be affected within a wider Zone of Influence – notably between 6 and 9km for golden eagles (*Aquila chrysaetos*) (SNH, 2016). As such, a formal data request was submitted to Highland Raptor Study Group (HRSG), and a meeting was held with Stuart Benn (eagle coordinator) on 11 January 2023, to ensure these species were appropriately considered in this assessment. This meeting focused on the numbers, locations, and historic success of golden eagle territories, and the status of the local population.

This information was used to give an overview of the existing ecological environment within the site and surroundings, provide information on sensitive species and provide information on statutory sites designated for their ornithological interest. This information was used to put bird populations known from the proposed development into context in terms of their ecological importance.

Further details are provided in the sections below.

Review of Existing Information for Creag Riabhach Wind Farm

Although CRWF started commissioning in November 2022, construction activities are still taking place on-site. A considerable amount of information has been gathered during work on CRWF, relevant to the assessment of the proposed development. Although surveys were undertaken using older best practice guidance which has subsequently changed, additional information from post-consent monitoring and updated desk-based study has also been used, meaning this is unlikely to represent a significant limitation.

The following sources of survey data have been considered in this chapter:

- CRWF Environmental Statement (Creag Riabhach Wind Farm Ltd, 2013 – this includes one year of flight activity surveys with at least 36 hours of observation from each Vantage Point (VP) location in each of the breeding and non-breeding seasons[25], breeding and wintering bird surveys, breeding raptor and owl surveys, breeding diver surveys, and black grouse lek surveys (see **Figure 8.1** for VP locations and **Figure 8.2** for survey areas in context of this proposed development);
- Natural Power Updated Collision Mortality Assessment (Natural Power, 2020a)[26];
- Natural Power Post-consent Protected Species Monitoring (Natural Power, 2020b)[27] and associated datasets (including breeding birds) between 2018 and 2022; and
- Anecdotal observations made during construction by ecologists working in the area.

These are described in greater detail in **Technical Appendix 8.1**.

Existing Records

Details of data providers are listed in **Table 8.3** below.

In addition, relevant available digital datasets and published reports were also reviewed. The National Biodiversity Network (NBN) database was searched for ornithological records – only records with licences allowing commercial use were included (Creative Commons Attribution License and Open Government Licence). Another licence available for use on the NBN Atlas is the Creative Comms Attribution Non-Commercial (CC-BY-NC) licence. CC-BY-NC data can only be used for non-commercial purposes and can therefore not be referenced in this chapter.

For all sources, records from the past ten years were included in the results since older data is less likely to be an accurate reflection of the current baseline, with the exception of golden eagles for which longer-term context was required to understand local territories. In addition, a 6km buffer was used for eagle records, and 2km for all other species records.

Table 8.3: Summary of requests for existing eagle records within 6km of the proposed development site, and 2km for all other species

Organisation	Information Requested
British Trust for Ornithology (BTO)	Records of all species of conservation concern
HRSG	Records of all species of conservation concern
Highland Biological Recording Group (HBRG)	Records of all species of conservation concern
RSPB	Records of all species of conservation concern
NS	Records of all species of conservation concern

[25] Note that only VPs 2 and 3 are relevant to the proposed development.

[26] Natural Power. 2020a. *Creag Riabhach Wind Farm. Updated Collision Mortality Estimate.* Natural Power, Inverness.

[27] Natural Power. 2020b. *Creag Riabhach Wind Farm CEMP. Technical Appendix J: Species Protection Plans.* Natural Power, Inverness.

Organisation	Information Requested
NS SiteLink	Statutory sites of ecological importance and their features

Statutory Sites

A search was also made for the following statutory sites designated for ecological interest[28]:

- Sites of international importance within 20km of the proposed development (SPAs and Ramsar sites); and
- Sites of national importance within 5km of the proposed development (SSSI and National Nature Reserves (NNR)).

8.4.3 Golden Eagle Topographical Model

Where it is necessary to assess impacts of a wind farm development on golden eagles, NS now recommends the use of the Golden Eagle Topographical (GET) model as detailed in Fielding *et al.* (2019)[29]. This model uses golden eagle telemetry data to predict use of the airspace above the landscape based on three key topographical variables: space above slopes greater than 10º, at an altitude of ≥300m, and within 300m of a ridge. The GET data is open access, kindly provided by Alan Fielding (Haworth Conservation Ltd) on 10 January 2023, and is used in this assessment.

8.4.4 Collision Risk Modelling

Where there has been sufficient flight activity at Potential Collision Height (PCH), collision risk modelling has been conducted following the Band Model, in accordance with SNH guidance (Band *et al.,* 2007; SNH, 2000).

Full details of the methodology can be found in **Technical Appendix 8.1**.

The flight activity rate applied to collision risk modelling was calculated using a weighted average: as the visible area from each VP (the viewshed) was not the same, a different level of observation effort was completed per unit area at each. As such, even though the number of observation hours was identical at each VP, more effort was spent watching the visible area of the smaller viewshed. Predictions of random flight activity made from the smaller VP area are more likely to be accurate than those from the VP where the same number of hours was spent watching a larger area. Therefore, the average was weighted by the level of effort per VP in order to produce a more representative flight activity rate. This was done by dividing the visible area from the VP (viewshed) by the observation time completed from this VP. This produces a measure of observer effort per unit area which is used to calculate a weighted average activity rate.

[28] The NatureScot Sitelink register was accessed to obtain information on the above designated sites.

[29] Fielding, A.H., Haworth, P.F., Anderson, D., Benn, S., Dennis, R., Weston, E. & Whitfield, D.P. 2019. A simple topographical model to predict Golden Eagle *Aquila chrysaetos* space use during dispersal. *Ibis* **162**, 400-415.

8.4.5 Future Baseline

In accordance with EcIA best practice, the baseline used for the assessment is not simply the survey results, but an interpretation of these taking in to account future changes that are likely to occur – i.e., the baseline at the time the proposed development is constructed, operational, and decommissioned (CIEEM, 2018). There is a possibility that climate change may affect bird populations, for example wetter spring weather will increase mortality of black grouse chicks, while drier summers affect breeding waders through reduced prey availability (Pearce-Higgins, 2021)[30]. However, the effects may be mitigated in the local area by habitat restoration associated with CRWF (Creag Riabhach Wind Farm Ltd, 2013). Otherwise, as there are no proposed land use changes, and climate change is unlikely to have a measurable effect on much ecology in this area within the proposed development lifetime, in most cases the future baseline will be the same as the current baseline. However, where this is not the case, this is described where relevant in the assessment.

The future baseline in relation to climate change is discussed in detail in **Chapter 14: Other Issues** of this EIA Report.

8.4.6 Difficulties and Uncertainties

No novel baseline surveys have been undertaken for ornithology. However, although CRWF started commissioning in November 2022, construction activities are still taking place on-site. Any data gathered is unlikely to be representative of the baseline, as species will likely be disturbed by the construction activities. Therefore, historic data is likely to be more representative, and better suited to inform a robust assessment for the proposed development. A considerable amount of information has been gathered during work on CRWF, relevant to the assessment of the proposed development. Although surveys were undertaken using older best practice guidance (SNH, 2010), which has subsequently changed, additional information from post-consent monitoring and updated desk-based study (including a meeting with Stuart Benn, HRSG's eagle coordinator) has also been used, meaning this is unlikely to represent a significant limitation.

Whilst the use of NBN Atlas data is considered standard and appropriate in desk studies, it is (as for all desk-study data) important to note that the absence of records does not indicate that a particular species is absent from the search area; particularly considering the restrictions on the commercial use of certain datasets. By contacting a range of organisations that hold specific data on protected species in the area, this is not considered a significant limitation.

8.5 Impact Assessment Methodology

This assessment covers all potential impacts identified through the scoping process, as well as any further potential impacts that have been highlighted as the EIA has progressed. It should be noted that impacts are not necessarily relevant to all stages of the proposed development.

[30] Pearce-Higgins, J.W. 2021. *Climate Change and the UK's Birds.* British Trust for Ornithology, Thetford.

The approach adopted for the assessment of ecological impacts on Ornithology is in line with published best practice guidance for EcIA produced by CIEEM (2018), and therefore, differs from that described in **Chapter 2: EIA Approach and Methodology**. This guidance sets out the process for assessment through the following stages:

- Determination of the importance of ecological features through desk study and surveys;
- Identification and characterisation of potential effects to determine level of impact;
- Assessment of likely significant impacts;
- Identification of requirement for measures to avoid and mitigate (reduce) these impacts;
- Identification of any monitoring requirements;
- Assessment of the significance of any residual impacts after mitigation; and
- The worst-case scenario estimates habitat loss in the event that the construction works take place within the most sensitive habitats.

8.5.1 Determining Importance

According to the CIEEM guidance (2018), determining which ecological features are important and should be subject to detailed assessment is one of the key challenges in the EcIA process. Ecological features can be important for a variety of reasons, and may relate, for example to:

- Quality or extent of designated sites or habitats;
- Habitat/species rarity;
- The extent to which they are threatened throughout their range; or
- Their rate of decline.

The level of importance of ecological features identified at the site has been determined using the criteria defined in **Table 8.4** in line with CIEEM guidance, these criteria have been determined with regard to statutory requirements and policy objectives for biodiversity.

In addition, where relevant and where information is available, use is made of contextual information about distribution of habitats and species, and species abundance, including trends based on historical records. As available quantitative data on a particular habitat or species may be limited, particularly below the international and national level, the evaluation of importance may also involve an element of professional judgement.

Evaluations are based upon a combination of information gathered via the desk study and field survey results, along with professional experience and judgement. Social and economic factors are also considered when assessing ecological features if appropriate.

In addition to the importance of a habitat or species *per se*, the assessment of Ornithology presented in this chapter also considers the value of the proposed development and surroundings for each ecological feature in terms of the extent of habitat present, the number of individuals present or the nature and level of use. For example, if one or more pairs of birds included on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) was found to be breeding within the site, the species would likely be assigned a medium or higher importance level (depending on population status and trends). However, if a single Schedule 1 bird flew across the site on one or two occasions only, and little or no suitable breeding habitat was present, it would likely be assessed as being of low importance.

Features of negligible importance have not been carried forward for assessment.

Table 8.4: Criteria for Evaluation of Importance Level of Bird Species

Importance Level	Criteria	Examples
Very high	Birds that are part of an internationally important population.	• A species listed as a qualifying feature of a site of international importance designated for its avian interest, i.e., SPAs and RAMSAR sites. • A species present in internationally important numbers.
High	Birds that are part of a nationally important population.	• A species listed as a qualifying feature of a site of national importance designated for its avian interest, i.e., SSSIs and NNRs. • A nationally important population/assemblage of a Schedule 1 or Annex I species. • A species present in nationally important numbers.
Medium	Birds that are part of a regionally important population.	• A regionally important (e.g. within a NHZ) population/assemblage of a Schedule 1 or Annex I species. • A regionally important population of a species included on the SBL. • A regionally important population/assemblage of a species included on the UK BoCC Red or Amber list.
Low	Birds that are part of a locally important population.	• A species listed as an important feature of a Site of Importance for Nature Conservation (SINC) or equivalent site selected on local authority criteria. • A species listed as an important feature of a Local Nature Reserve (LNR). • A locally important population of a species included on the SBL. • A locally important population/assemblage of a species included on the UK BoCC Red or Amber list. • All populations/assemblages of Schedule 1 species that have not been captured in higher categories above. • Assemblages of other species that are of importance in the context of the local authority area (e.g. LBAP priority species). • Other species that are, in the opinion of the assessor, of note and for which mitigation measures could be recommended as a good practice measure.
Negligible	Common and widespread species that are of little or no intrinsic nature conservation value.	• All other species that are widespread and common and which are not present in locally, regionally, nationally or internationally important numbers.

8.5.2 Identification and Characterisation of Potential Effects

In line with CIEEM guidance (2018), reference is made to the following characteristics when describing potential ecological effects:

- Nature of impact: whether an impact is positive/beneficial to habitats (e.g. by improving habitat structure) or to species (e.g. by increasing species diversity or extending habitat) or negative/detrimental to habitats (e.g. by direct habitat destruction) or to species (e.g. by loss of or displacement from suitable habitat);
- Extent: the spatial or geographical area over which the effect may occur;
- Magnitude: the size, amount, intensity and volume. This should be quantified if possible and expressed in absolute or relative terms (e.g. the amount of protected habitat lost or percentage decline in a species population);
- Duration: the length of time the activity occurs over. This should be defined in relation to ecological characteristics (e.g. a species lifecycle) as well as human timeframes. It should also be noted that the duration of an activity may differ from the duration of the resulting effect (e.g. if short-term construction activities cause disturbance to red-throated divers during their breeding period, there will be long-term implications from failure to reproduce that season);
- Reversibility: an irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation;
- Frequency: the number of times an activity occurs. This may influence the resulting effect; and
- Timing: the time of year during which the activity occurs. This may result in an effect on an ecological feature if it coincides with critical life-stages or seasons (e.g. the breeding bird season).

The timescales of potential effects on ecological features are considered. Incorporated into this evaluation is the reversibility of the effect, which is based on the duration of the impact, or the time required for the feature to return to baseline pre-construction conditions (Regini, 2000)[31]. Knowledge of how rapidly the population or performance of a species is likely to recover following loss or disturbance (e.g. by individuals being recruited from other populations elsewhere) is used to assess reversibility, where such information is available.

The following definitions have been applied with regard to timescales:

- Immediate: within approximately 12 months;
- Short-term: within approximately one to five years;
- Medium-term: within approximately six to 15 years; and
- Long-term: more than 15 years.

[31] Regini, K. 2000. Guidelines for Ecological Evaluation and Impact Assessment. *Ecology & Environmental Management In Practice, Bulletin of the Institute of Ecology and Environmental Management.* Available at: https://cieem.net/wp-content/uploads/2019/01/InPractice29sept2000.pdf

Table 8.5 below indicates all of the potential direct and indirect impacts assessed with regards to Ornithology and indicates the proposed development stages to which they relate.

Table 8.5: Impacts Requiring Assessment

Impact	Description
Construction	
Direct habitat loss due to land-take	The proposed construction works would involve construction of the turbines, battery energy storage system (BESS) facilities, and associated infrastructure, all of which would result in direct habitat loss.
Disturbance and damage/injury to habitats or protected species	During the construction phase the potential effects of associated noise and visual disturbance could lead to the temporary displacement or disruption of breeding and foraging birds. Potential effects are likely to be greatest during the breeding season (mainly between March and August, depending on species) and behavioural sensitivity to the effects will vary between species. Disturbance to birds is becoming increasingly well understood, although it depends heavily on the individuals involved. However, larger bird species, those higher up the food chain or those that feed in flocks in the open tend to be more vulnerable to disturbance than small birds living in structurally complex or closed habitats such as woodland (Hill *et al.*, 1997)[32]. The potential effects associated with construction activities are only likely to occur for as long as the construction phase continues. The exception to this would be if an adverse effect on the breeding success of a receptor were such that the local population becomes extinct and replacement through recruitment or recolonisation does not occur.
Indirect effects on habitats or protected species, e.g. due to pollution or sedimentation	Indirect effects on habitats and species as a result of construction activities include hydrological effects, pollution, sedimentation and effects of dust.
Operation and maintenance	
Collision	Collision of a bird with the turbine rotors is almost certain to result in the death of the bird. In low density populations, such as raptors, this could have a more adverse effect on the local population than in higher density populations (e.g., skylark) because a higher proportion of the local population would be affected in a low density population. The frequency and likelihood of a collision occurring depends on a number of factors. These include aspects of the size and behaviour of the bird (including their use of the site) the nature of the surrounding environment and the structure and layout of the turbines. Collision risk is perceived to be higher for birds that spend much of the time in the air, such as foraging raptors and those that have regular flight paths between feeding and

[32] Hill, D., Fasham, M., Tucker, G., Shewry, M., Shaw, P. 2005. *Handbook of Biodiversity Methods.* Cambridge University Press, Cambridge.

Impact	Description
	breeding/roosting grounds (e.g. divers). The majority of bird fatalities at wind farms have occurred on major migration routes, in reduced visibility or at night (Crockford, 1992[33]; Gill *et al.,* 1996[34]; Thelander *et al*., 2003[35]) Birds are also more susceptible if the wind farm is located in an area of unusually high prey density. A close array of turbines across a natural wind funnel (a "wind wall") has also been known to cause increased bird mortality. For diurnal foraging raptors, the proximity of structures on which to perch can increase the likelihood of collision with turbines (Orloff & Flannery, 1996)[36]. It should be noted that operational disturbance and collision risk effects are mutually exclusive in a spatial sense: *i.e.* a bird that avoids the wind farm area due to disturbance cannot be at risk of collision with the turbine rotors at the same time. However, they are not mutually exclusive in a temporal sense; a bird may initially avoid the wind farm, but habituate to it, and would then be at risk of collision.
Disturbance due to maintenance works which are expected to be infrequent and small scale	The operation of turbines and associated human activities for maintenance purposes also has the potential to cause disturbance and displace birds from the proposed development site, although the magnitude of such an effect will be much lower than during the construction phase. Disturbance effects during the operational phase will be less than during the construction phase (Pearce-Higgins *et al.*, 2012)[37]. Studies have shown that most displacement is limited to 100m to 200m, from turbines, and generally birds are not disturbed beyond 500m to 800m and in some cases, birds do not appear to have been disturbed at all (Pearce-Higgins *et al.*, 2009[38]; Pearce-Higgins *et al.*, 2012). However, individual turbines, or the wind farm as a whole, may present a barrier to the movement of birds, restricting or displacing birds from much larger areas. The effect this would have on a population is subtle and difficult to predict with any great certainty. If birds regularly have to fly over or around obstacles or are forced into suboptimal habitats, this may result in reduced feeding efficiency and greater energy expenditure. By implication, this will reduce the efficiency with which they accumulate reserves, potentially affecting breeding success. During the lifetime of the wind farm, however,

[33] Crockford, N.J. 1992. *A review of the possible impacts of windfarms on birds and other wildlife. JNCC Report No. 27*. JNCC, Peterborough.

[34] Gill, J.P., Townsley, M. & Mudge, G.P. 1996. *Review of the impacts of wind farms and other aerial structures upon birds. Scottish Natural Heritage Review No. 21*. SNH, Edinburgh.

[35] Thelander, C.G., Smallwood, K.S. & Rugge, L. 2003. *Bird risk behaviours and fatalities at the Altamont Pass Wind Resource Area. Period of performance: March 1998 – December 2000*. National Renewable Energy Laboratory, Colorado.

[36] Orloff, S. & Flannery, A. 1996. *Avian mortality in Altamont Pass WRA – final report.* California Energy Commission, Sacramento.

[37] Pearce-Higgins, J.W., Stephen, L., Douse, A. & Langston, R.H.W. 2012. Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species anlysis. *Journal of Applied Ecology* **49**, 386-394.

[38] Pearce-Higgins, J.W. 2021. *Climate Change and the UK's Birds.* British Trust for Ornithology, Thetford.

Impact	Description
	birds may habituate to the presence of turbines, thus the effect is likely to be greatest in the short-term (Pearce-Higgins *et al.*, 2012).
Indirect effects on habitats and species, e.g. pollution of watercourses as a result of spillage	Maintenance works may also result in indirect effects on habitats, e.g. pollution of watercourses as a result of spillage. However, the potential for indirect effects to occur during operation is generally lower than that during construction.
Decommissioning	
Works associated with decommissioning may cause disturbance to ecological features. The level of effect will depend on the ecological features present at the time of decommissioning; although, this cannot be reliably predicted at this stage, it is likely that the habitats will be similar and will support a similar suite of species. As decommissioning works are likely to be of a similar nature and duration as construction activities, the potential effects resulting from decommissioning are likely to be similar to those resulting from construction, with the exception that habitat would be fully restored. A Decommissioning Plan will be written for the approval of the Planning Authority prior to the decommissioning phase. This Plan would include measures to protect ecology features.	

8.5.3 Geographic Context

Impacts on Ornithology are assessed in local and, if necessary, regional context as appropriate. For the purposes of the assessment, a local population refers to the population within Sutherland. If a potentially significant impact on a local population or habitat extent is identified, the assessment is extended to consider potential impacts on the wider regional population or habitat extent. However, if no significant effect on the local population or habitat extent is identified, consideration of the wider geographical area is not considered necessary, since this will result in potential effects that are of the same or lower level for those wider populations or habitat extents.

NS has defined NHZs within Scotland (SNH, 2002)[39], which they consider to be appropriate biogeographical spatial units against which regional effects of proposed developments can be assessed. NHZ classifications represent areas with a high level of biogeographic coherence and are unrelated to administrative boundaries. The proposed development lies within The Peatlands of Caithness and Sutherland NHZ. Where an assessment of a regional ecological feature is necessary, effects are assessed within this NHZ as far as possible. At this stage, however, there are limited data on habitats and populations of species available at the NHZ level.

8.5.4 Determining Magnitude of Effects

For the purposes of this assessment, the potential effects are assigned to different levels to assist the assessment process. The level of effects is defined using the criteria in **Table 8.6**. Note that these effects relate to negative effects; where positive effects are predicted, these are not assigned different levels.

[39] SNH. 2002. *Natural Heritage Zones: A National Assessment of Scotland's Landscapes.* SNH.

Table 8.6: Criteria for Defining Magnitude Level of Potential Effects

Effect level	Criteria
Very High	Total or almost complete loss of an ecological feature (population), likely to result in a permanent effect on its long-term ecological integrity and affect its conservation status.
High	Large-scale, permanent changes to an ecological feature, and likely to change its ecological integrity and affect its conservation status.
Medium	Moderate-scale, long-term changes to an ecological feature, or larger-scale temporary changes, but its long-term ecological integrity is unlikely to be affected, and any changes in conservation status are reversible.
Low	Small-scale, temporary effects on an ecological feature that do not affect ecological integrity or conservation status.
Negligible	Little or no detectable effect on an ecological feature

8.5.5 Significance of Impact

For Ornithology, potential effects are identified and significance of impact is assessed for each stage of the project lifecycle. Significance is attributed relative to the background conditions. The latest CIEEM guidance on EcIA (CIEEM, 2018) avoids and discourages use of the matrix approach to determining significance and describes only two categories: "significant" or "not-significant".

According to the CIEEM guidance (2018), for the purpose of EcIA, a "significant effect" is an effect that either supports or undermines biodiversity conservation objectives for important ecological features and biodiversity in general. Effects can be considered significant at a wide range of scales from international to local.

The guidance further states that "*in broad terms, significant effects encompass impacts on structure and function of defined sites, habitats, or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)*".

In line with this guidance, rather than using a matrix to determine significance, the approach used in this chapter is to consider the importance and sensitivity of the habitats and populations and the characteristics and severity of the effect. Professional judgement is applied as to whether the ecological integrity of a habitat or population will be affected.

The term "ecological integrity" refers to the maintenance of the conservation status of a habitat or population of a species at a specific location or geographical scale. This is used here in accordance with the definition adopted by the ODPM Circular 06/2005 on Biodiversity and Geological Conservation (Ministry of

Housing, Communities and Local Government, 2005)[40], whereby designated site integrity refers to "*the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified*".

Effects are more likely to be significant where they affect a habitat or species of higher levels of importance, threaten the integrity of a habitat or population, or where the severity of the effect is high. Effects not considered to be significant would be those that do not threaten the integrity of an ecological feature or where the habitat or population affected is considered to be of low importance.

In this assessment, an effect that threatens the integrity of a habitat or species population is considered to be significant. Effects that do not threaten the integrity of a habitat or population are considered to be not significant.

Where appropriate, mitigation measures are identified to avoid and reduce potentially significant effects. It is also good practice to propose mitigation measures to reduce negative effects that are not significant.
The significance of residual effects on habitats and populations following implementation of mitigation is then determined along with any monitoring requirements.

8.5.6 Cumulative Impact Assessment

Effects may not be detected when considering the proposed development in isolation, but have potential to become significant in combination with other effects. Therefore, the need to consider cumulative effects is a requirement under CIEEM guidance (CIEEM, 2018). Projects to be incorporated in such an assessment must include existing and consented developments, as well as those at the application stage.

As different projects often employ differing baseline and impact assessment methods, data often cannot be directly compared. Quantitative assessment of cumulative effects is, therefore, often not possible. Furthermore, as there is no compulsion for developers to share commercial data with other companies, it is often difficult to acquire a full dataset. Therefore, a comprehensive and quantitative cumulative impact assessment is rarely possible. However, every effort has been made to provide a qualitative assessment that is as robust as the available public data allows.

The context in which cumulative effects are considered depends upon the ecology of the species in question. For example, it may be appropriate to consider cumulative effects to geese associated with an SPA within the context of their wider foraging range. For other species, such as breeding waders, it may be appropriate

[40] Ministry of Housing, Communities and Local Government. 2005. *Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7692/147570.pdf

to consider the effects on the local population in the context of any planned developments in the immediate vicinity which have the potential to cause additional displacement.

Where no measurable effect is predicted as a result of the proposed development, it is considered that no cumulative impacts can be assessed, as there would be no definable addition to the impacts predicted by other projects.

8.5.7 Assessment of Transboundary Effects

In line with CIEEM guidance, transboundary effects must be considered where relevant (CIEEM, 2018). Transboundary effects may occur where predicted effects are not limited to features within a single administrative, so that all relevant authorities are able to take appropriate action. However, in the context of the proposed development, impacts on Ornithology will be localized within one administrative region, and no pathway for transboundary effects has been identified.

8.5.8 Embedded Mitigation and Management Plans

As part of the proposed development design process, a number of designed-in measures have been proposed to reduce the potential for impacts on Ornithology (**Table 8.7**). As there is a commitment to implementing these measures, they are considered inherently part of the design of the proposed development and have, therefore, been considered in the assessment presented below (i.e., the determination of magnitude of impact and therefore significance of effects assumes implementation of these measures). These measures are considered standard industry practice for this type of development.

Table 8.7: Embedded Mitigation Measures Specific to Ornithology

Embedded Mitigation Measure	Justification
Avoidance of designated sites	The site boundary has been designed to ensure there is no direct interaction with habitats within designated sites.
Construction Environmental Management Plan (CEMP)	The CEMP will set out procedures to ensure all activities with potential to affect the environment are appropriately managed. An outline CEMP is included in **Technical Appendix 3.1**. Further protocols in relation to the protection of birds which will be secured through the CEMP are detailed below.
Best Practice Measure in relation to locally occurring birds	The CEMP will ensure all trenches and excavations will be fenced or covered over at night to prevent any animals from falling in and becoming trapped. If this is not possible, an adequate means of escape must be provided (i.e., a gently graded side wall or provision of gently sloped wooden plank or equivalent). Piping will be capped to avoid its potential use as refugia by animals.
Pre-construction Surveys.	Pre-construction surveys for birds will be undertaken to identify any species making use of the Development area, and relevant buffers, ahead of works, including:

Embedded Mitigation Measure	Justification
	• Breeding birds within 500m of the site; • Breeding raptors within 1km of the site; and • Lekking black grouse within 1km of the site. Should any bird nest be identified, specific mitigation would need to be developed in consultation with NS. Specific mitigation to be detailed in the CEMP.
Ecological Clerk of Works (ECoW)	An independent ECoW would be appointed to audit site activities and will advise on implementation of mitigation. The ECoW will deliver toolbox talks to construction team members to make them aware of ecological sensitivities and the procedures to follow.
Ornithology Watching Brief	The CEMP would include details of a watching brief which would ensure that the correct procedure can be followed if a bird nest is found during devegetation or groundbreaking works. When the ECoW is not present onsite, works must stop within a buffer appropriate to the species (to be defined in CEMP) as soon as it is safe to do so. Advice must then be sought from the ECoW and an approach agreed upon with NS (if appropriate) prior to works recommencing.
Pollution Prevention Plan	A Pollution Prevention Plan will be included as part of the CEMP. Proposed pollution prevention measures are outlined in **Technical Appendix 3.1**.
Wet Weather Protocol	This would detail the procedures to be adopted by all staff during periods of heavy rainfall e.g. inspection and maintenance regimes of sediment and runoff control measures will be adopted during these periods. This protocol would be detailed within the CEMP.
Drainage Strategy (DS)	Prior to construction, a DS for the proposed development will be prepared. The DS will detail the site drainage design e.g. Sustainable Drainage Systems (SuDS) if required, including any necessary ponds, swales, cross drains and bunds, to ensure that runoff from hard surfaces within the substation / switchgear will be controlled and managed. The DS will further detail how groundwater flows will be maintained around sub-surface structures such as foundations and cable ducts. The DS would be submitted to THC consultees for agreement prior to construction. A conceptual drainage layout plan for EXT 01 to inform the likely arrangement of the drainage network has been prepared as requested by SEPA in their scoping response. This is shown on **Figure 9.1**. Further details of the drainage strategy are included in **Chapter 9: Hydrology, Hydrogeology and Soils**.
Pre-works Nesting Bird Checks	Nesting bird checks will be undertaken within 24 hours prior to any devegetation or ground-breaking works. If a nest is found, an exclusion zone appropriate to the species would be implemented. The nest will be monitored, and the exclusion zone lifted only after the ECoW has confirmed breeding has ended.
Operational Environmental Management Plan (OEMP)	The applicant would collate an OEMP to guide on-going operations and maintenance activities during the life-cycle of the project. The OEMP would also set out the procedures for managing and delivering the specific environmental

Embedded Mitigation Measure	Justification
	commitments, as per each technical chapter for each receptor over the operational period.
Decommissioning Plan	A Decommissioning Plan would be prepared for the Development and agreed with the Planning Authority prior to decommissioning works being undertaken. The plan would include any measures required to protect ecological features during decommissioning which are likely to be similar to those proposed within the CEMP.

8.5.9 Data Gaps and Uncertainties

No data gaps have been identified with regards to the assessment methodology.

8.6 Assessment of Potential Effects

A summary of the evaluation of the importance of habitats and species recorded within the Ornithology Study Area during baseline surveys is provided in **Table 8.8.**

Table 8.8: Evaluation of the level of Important Ecological Features Identified for Ornithology

Importance	Ecological Feature(s)	Justification
Very High	Black-throated diver (*Gavia arctica*) Red-throated diver (*Gavia stellata*) Golden eagle Merlin (*Falco columbarius*) Hen harrier (*Circus cyaneus*) Dunlin (*Calidris alpina*) Greenshank (*Tringa nebularia*) Golden plover (*Pluvialis apricaria*)	Species associated with Caithness and Sutherland Peatlands SPA due to the international importance of their local populations.

Importance	Ecological Feature(s)	Justification
High	Pink-footed goose (*Anser brachyrhynchus*) Greylag goose (*Anser anser*) Barnacle goose (*Branta leucopsis*) Whooper swan (*Cygnus cygnus*)	These species were found during winter surveys. Although there are no SPAs including these as qualifying features in winter within 20km of the proposed development, all will visit an SPA within the UK at some point during their winter migration. Although not representing internationally important populations within the context of the Development they do contribute towards populations of international importance elsewhere in the UK. Therefore, they are considered to be of at least national importance.
	Peregrine (*Falco peregrinus*) Barn owl (*Tyto alba*)	Peregrine are both listed under Schedule 1 of the WCA, reflecting the importance to conserve these species. Barn owl are also less common in Caithness and Sutherland than elsewhere in Scotland, likely due to limited nesting opportunities, which increases their importance.
Medium	Black grouse (*Tetrao tetrix*) Arctic skua (*Stercorarius parasiticus*) Cuckoo (*Cuculus canorus*) Snow bunting (*Plectrophenax nivalis*) Fieldfare (*Turdus pilaris*)	Black grouse, Arctice skua, cuckoo, and fieldfare are all included on the BoCC Red List. Snow bunting is included on the BoCC Amber List. Furthermore, black grouse, Arctic skua, cuckoo, and snow bunting are included on the SBL. Note that although snow bunting and fieldfare are included on Schedule 1 of the WCA, this relates to breeding only, while these species were only observed during winter at the site.
Low	Skylark (*Alauda arvensis*)	Although skylark are included on the BoCC Red List, this relates to large declines in areas of arable farming, where there has been a switch from spring to autumn-sown cereal crops. The site and surrounding areas consist of upland habitats, and skylark populations remain abundant.
Negligible	All other common and widespread bird species (including buzzard (*Buteo buteo*), sparrowhawk (*Accipiter nisus*), kestrel (*Falco tinnunculus*), gulls, corvids and common breeding passerines such as willow warbler (*Phylloscopus trochilus*)).	

8.6.1 Species Not Taken Forward to the Assessment Phase

As detailed in **Section 8.5.1**, species of negligible importance are not considered further in this assessment; these are generally common and widespread ecological features.

8.6.2 Species Taken Forward to the Assessment Phase

Results from the desk study and all relevant field surveys have been compiled to produce baseline descriptions for each species of a low or higher level of importance recorded within the survey area. Features are described in order of importance level, with those of greatest importance considered first.

To avoid repetition, where potential effects on ecological features of the same level of importance are likely to be similar due to similarities in ecology and/or distribution, they are assessed as a group rather than separately for each feature.

Although no significant impacts on ecological features of low value are likely, nevertheless, these features are considered because they are of local conservation importance, and additional mitigation measures could be recommended for such features as a good practice measure.

8.6.3 Designated Sites

Consultation and a search of available digital datasets indicates that there are no statutory designations of European importance (e.g. SPAs) or national importance (e.g. SSSI) within the application site boundary. **Table 8.9** provides details of statutory designations of European importance within 20km and biological SSSIs within 5km of the proposed development which include ornithological features, and these are shown in **Figures 8.3 and 8.4**. Full citations for statutory designated sites can be requested from Caledonian Conservation Ltd or can be obtained at https://sitelink.nature.scot/home.

Table 8.9: Designated Sites

Designation	Site name	Distance (km)	Comments
SPA/RAMSAR	Caithness & Sutherland Peatlands	Adjacent	Internationally important breeding bird populations including: • Golden eagle; • Hen harrier; • Merlin; • Short-eared owl (*Asio flammeus*); • Black-throated diver; • Red-throated diver; • Wigeon (*Anas penelope*); • Common scoter (*Melanitta nigra*); • Dunlin; • Greenshank; • Golden plover; and • Wood sandpiper (*Tringa glareola*).

Designation	Site name	Distance (km)	Comments
			Should these species overfly the proposed development site when foraging or commuting, there may be a potential effect through risk of collision with turbines. Furthermore the site may support breeding populations of these species.
SSSI	Cnoc an Alaskie	Adjacent	Nationally important assemblage of breeding birds, including: • Golden-eagle • Merlin • Red-throated diver • Teal (*Anas crecca*) • Dunlin • Greenshank • Wood sandpiper Should these species overfly the proposed development site when foraging or commuting, there may be a potential effect through risk of collision with turbines. Furthermore the site may support breeding populations of these species.
SPA	Foinaven	15.7km NNE	Internationally important population of breeding golden eagles. Should this species overfly the proposed development site when foraging or commuting, there may be a potential effect through risk of collision with turbines. Furthermore, the site may support breeding populations of this species.
SPA	Lairg and Strath Brora Lochs	15.8km SSE	Internationally important population of breeding black-throated divers. Should this species overfly the proposed development site when foraging or commuting, there may be a potential

Designation	Site name	Distance (km)	Comments
			effect through risk of collision with turbines. However, any black-throated divers observed overflying the proposed development area are more likely to be associated with populations breeding in closer proximity to the site. Therefore, any impact on this SPA is unlikely.

8.6.4 Ecological Features of Very High Importance

Divers

As red-throated divers and black-throated divers are a qualifying feature of Caithness and Sutherland Peatlands SPA and listed under Schedule 1 of the Wildlife and Countryside Act, they are considered to be of very high importance. Red- and black-throated divers are also included on the SBL. Furthermore, black-throated divers are Amber listed.

Baseline

Due to their sensitivity, additional details informing the red- and black-throated diver assessment can be found in the Confidential Annex. However, a general summary is provided in the assessment below.

Although a single red-throated diver territory and one black-throated diver territory were found in the wider area during surveys in 2013, neither were within 1km of the proposed development, and considerably beyond the recommended 750m disturbance buffer (see Confidential Annex) (Goodship & Furness, 2022).

A single red-throated diver flight was recorded in 2013, although, this was over 5km from the nearest extension turbine location (Creag Riabhach Wind Farm Ltd, 2013). Furthermore, breeding was not confirmed at any territories.

No divers were recorded during post-consent monitoring, which was undertaken within 1km of the CRWF construction site (Natural Power data).

Potential Construction Effects

As there are no diver territories within disturbance distance from the proposed development, **No Effect** is predicted during construction.

Potential Operational Effects

No red- or black-throated diver flights were recorded over the proposed development site, and no territories were found to be occupied within 1km of the proposed development.

Red-throated divers generally commute from their breeding territories to feed on larger waterbodies or coastal waters, while black-throated divers tend to forage on their breeding waterbody or commute to larger waterbodies. Any divers breeding within the surrounding area would not overfly the proposed development when commuting. This is because any flightpath from potential breeding waterbodies to feeding waterbodies would not intersect with the proposed development. Therefore, flight activity over the site is considered highly unlikely, and **no impact** is predicted.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no impact is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on divers will be localized within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant Impact is predicted on divers or the associated conservation objectives of Caithness and Sutherland Peatlands SPA.

Golden Eagle

As golden eagles are a qualifying feature of Caithness and Sutherland Peatlands SPA, and listed under Schedules 1, 1A, and A1 of the Wildlife and Countryside Act, they are considered to be of very high importance. Golden eagle is also included on the SBL.

Baseline

Due to their sensitivity, additional details informing the golden eagle assessment can be found in the Confidential Annex. However, a general summary is provided in the assessment below.

Although two golden eagle territories are known from the wider area (HRSG data; Stuart Benn, pers. comm., 2023[41]; Pieter Bakker, pers. comm., 2019[42]), no evidence of successful breeding was found during 2013 surveys.

Data provided by HRSG and detailed discussions with Stuart Benn (HRSG eagle coordinator) has confirmed that, although golden eagle territories have increased throughout Scotland, and the Highlands, the population local to CRWF has remained stable since the assessment for CRWF in 2013. This is likely to be largely due to more suitable habitat available elsewhere in the region.

Golden eagle flights were observed during flight activity surveys undertaken to inform the original Environmental Statement. However, the majority of these followed a predictable flight corridor to the north of the original CRWF site, following Creag Riabhach ridge (see **Figure 8.5**). Many of these flights were at a lower altitude than was observed elsewhere, and at potential collision height. This is consistent with slope soaring using lift generated over cliffs and steep slopes (Katzner *et al.*, 2012)[43]. Only a single random golden eagle flight was observed over the CRWF area, at potential collision risk height (see **Figure 8.5**).

Since the original CRWF Environmental Statement was completed, a new tool for assessing impacts on golden eagles have become available – the GET model (Fielding *et al.*, 2019). The situation of the proposed development has been compared with the GET model dataset, and is consistent with the observed flights and predictions made regarding likely golden eagle activity over the site (see **Figure 8.6**).

Golden eagle flights observed post-consent are also consistent with the baseline used for assessment in the original Environmental Statement and golden eagle territories known in the area (Creag Riabhach Wind Farm Ltd, 2013; Natural Power data; Tommy McDermott, pers. comm., 2023[44]; Niall Currie, pers. comm., 2023[45]; Tony Monir, pers. comm., 2023[46]).

No golden eagle nesting attempts were recorded during post-consent monitoring, which was undertaken within 1km of the CRWF construction site (Natural Power data).

The current estimate for the breeding population of golden eagles within NHZ 5 is 18 birds/nine pairs, and 10 birds/five pairs associated with Caithness and Sutherland Peatlands SPA (Alexander Macdonald, pers. comm., 2023[47]).

[41] S. Benn. 2023. Discussion during meeting, 11 January.
[42] P. Bakker. 2019. Discussion during site visit, 20 February.
[43] Katzner, T.E., Brandes, D., Miller, T., Lanzone, M., Maisoneuve, C., Tremblay, J.A., Mulvihill, R. & Merovich Jr, G.T. 2012. Topography drives migratory flight altitude of golden eagles: implications for on-shore wind energy development. *Journal of Applied Ecology* **49** 1178-1186.
[44] T. McDermott. 2023. Telephone discussion and e-mail correspondence, 10 January.
[45] N. Currie. 2023. Discussion during meeting, 17 January.
[46] T. Monir. 2023. Telephone discussion, 17 January.
[47] A. Macdonald. 2023. E-mail correspondence, 10 January.

Potential Construction Effects

No golden eagle territories were found within the recommended disturbance buffer of 1km from the proposed development, and no known historic nest sites are located within this range (Goodship & Furness, 2022; HRSG data; Creag Riabhach Wind Farm Ltd, 2013; Natural Power data; Tommy McDermott, pers. comm., 2023; Niall Currie, pers. comm., 2023; Tony Monir, pers. comm., 2023). Therefore, **No Effect** is predicted on breeding golden eagles**.** More detail on local golden eagle territories is provided in the Confidential Annex to **Technical Appendix 8.1**.

The proposed development offers poor foraging habitat for golden eagles, as evidenced by the low level of activity observed during pre-application surveys and post-consent monitoring (Creag Riabhach Wind Farm Ltd, 2013; Natural Power data; Tommy McDermott, pers. comm., 2023; Niall Currie, pers. comm., 2023; Tony Monir, pers. comm., 2023). The Site itself supports very little in the way of suitable prey species, due to the degraded nature of the peatland habitat. Furthermore, it is not used for livestock. As such, the site is not considered to offer important foraging habitat for golden eagles, and so, **No Effect** is predicted after any loss to development (Creag Riabhach Wind Farm Ltd, 2013). Therefore**, No Effects** are predicted**.**

Potential Operational Effects

No golden eagle territories have been identified within the recommended disturbance buffer of 1km from the site, and no known historic nest sites are located within this range (HRSG data; Goodship & Furness, 2022). Therefore, **no effect** is predicted on breeding golden eagles through disturbance.

The level of observed activity over the site is extremely low, and the site offers poor foraging habitat with few waders or mammals. It is therefore considered that any loss of suboptimal habitat will have an irreversible effect of negligible magnitude. Therefore, **No Significant Effect** is predicted.

The predictable flight corridor over Creag Riabhach ridge is located over 2km from the proposed development, and so is not considered in collision risk modelling as there is no risk of collision for golden eagles using this route (see **Figure 8.5**). The application site itself does not offer any similar topographical features, and is much flatter with only gentle slopes. The topography offered by the site does not generate lift, but instead may offer thermals which eagles may use on occasion to soar at high altitudes (often over 1,000m), and so does not present a high risk of collision (Katzner *et al.*, 2012).

Furthermore, comparison of the proposed development's location and the GET model dataset also predicts that golden eagle flight activity is more likely north of the turbines, and less likely over the site itself (see **Figure 8.6**).

A single random golden eagle flight was observed during 2013 surveys, at potential collision risk height (see **Figure 8.5**). The circumstances surrounding this flight were quite particular: ravens mobbed the eagle while it was flying offsite and outwith the VP viewshed. As a result of the mobbing, the golden eagle altered its

flight route to try and avoid the ravens, which brought it through the viewshed and over the site. It is highly likely that ravens will change their behaviour around the wind farm area after construction, and similar activity in the future is therefore unlikely. However, a precautionary approach was adopted and collision risk modelling completed for this single random golden eagle flight. Full details of collision risk modelling are provided in **Technical Appendix 8.1**.

As the golden eagle flight was not obviously attributable to an active breeding territory, and any seasonal differences are impossible to estimate on the basis of one flight, it was assumed that a similar level of random activity may occur at any time of the year, rather than restricting calculations to a single season.

The accepted 99% avoidance rate has been used in collision risk calculations for golden eagle (Whitfield, 2009[48]; NS, 2018). Using the weighted average activity rate yields an estimated mortality of one bird every 168.70 years or 0.01 per year, which is less than one golden eagle during the operational life (40 years) of the wind farm. This is a negligible effect and would not affect the integrity of the breeding population or Caithness and Sutherland Peatlands SPA conservation objectives (see Potential Cumulative Effects below). As such the effect of collision on golden eagles is considered to be of negligible magnitude and reversible within the short- to medium-term. Therefore, **No Significant Effect** is predicted.

In reality, studies have shown that breeding and sub-adult golden eagles will actively avoid the entire turbine envelope of active wind farms, and so actual collision risk will almost certainly be considerably less (Walker *et al.*, 2005[49]; Fielding & Haworth, 2011[50]).

The Biodiversity Enhancement and Restoration Plan (BERP) would enhance habitat to the north of the site, increasing its suitability for foraging eagles, which would have a long-term positive **Effect** of medium magnitude.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As the proposed development does not offer good foraging habitat, no cumulative effect through loss of area is predicted. However, the BERP would enhance habitat to the north of the site, increasing its suitability for foraging eagles, which would have a positive effect.

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[48] Whitfield, D.P. 2009. *Collision avoidance of golden eagles at wind farms under the 'Band' collision risk model. Report from Natural Research to Scottish Natural Heritage.* Natural Research Ltd., Banchory.

[49] Walker, D., McGrady, M., McCluskie, A., Madders, M. & McLeod, D.R.A. 2005. Resident golden eagle ranging behaviour before and after construction of a wind farm in Argyll. *Scottish Birds* **25**, 24-40.

[50] Fielding, A.H., Haworth, P.F., Anderson, D., Benn, S., Dennis, R., Weston, E. & Whitfield, D.P. 2019. A simple topographical model to predict Golden Eagle *Aquila chrysaetos* space use during dispersal. *Ibis* **162**, 400-415.

Although the predicted collision mortality for the proposed development is not significant, it is important to consider this in a cumulative context, within the context of the NHZ 5 golden eagle population. This was completed using data provided by NS regarding wind farm projects within the area, their predicted effects on golden eagles, and the current estimate for the breeding population within NHZ 5 (18 birds/nine pairs) and Caithness and Sutherland Peatlands SPA (ten birds/five pairs) (Alexander Macdonald, pers. comm.). The contents of the data provided by NS were checked, and where there were discrepancies identified, the cumulative dataset was adjusted accordingly. **Table 8.10** shows the potential developments which may contribute towards a cumulative effect on golden eagles through collision mortality, and summarises the available data, including where this deviates from the NS dataset.

This table separates developments into the categories 'installed or approved' and 'application' to enable the potential cumulative effects to be considered for those developments that do exist or will exist (representing the minimum precautionary cumulative effect) and then with all potential developments (representing the worst case precautionary cumulative effect – note that it is considered highly unlikely that all proposed wind farms will gain consent and be operational concurrently with the proposed development).

Table 8.10: Predicted Cumulative Collision Effects for Golden Eagles.

Wind Farm	Planning Stage	Predicted Annual Golden Eagle Collision Mortality (99.0 % avoidance)
Installed or Approved		
Achairn	Installed	0.00
Achany	Installed	0.00
Baillie Hill	Installed	0.00
Bettyhill	Installed	0.00
Braemore	Approved	0.00
Buolfurich	Installed	0.00
Burn of Whilk	Installed	0.01
Camster	Installed	0.00
Causeymire	Installed	0.00
Creag Riabhach	Approved	0.04
Flex Hill	Installed	0.00
Forss 2	Installed	0.00
Gordonbush	Installed	0.07
Halsary	Installed	0.00
Kilbaur	Installed	0.00
Kilbaur Extension	Installed	0.00
Lairg	Installed	0.01
Lairg 2*	Approved*	0.03
Melness	Installed	0.00
Rosehall	Installed	0.00
Sallachy (2nd submission) (Sallachy 2)*	Approved*	0.10
Strath Tirry (Chleansaid)*	Approved*	0.47

Wind Farm	Planning Stage	Predicted Annual Golden Eagle Collision Mortality (99.0 % avoidance)
Strathy North	Installed	0.04
Strathy South	Approved	0.01
Strathy Wood+	Approved+	0.00+
Stroupster	Installed	0.00
Wathegar	Installed	0.00
Application		
Achany Extension (Glencassely 2)	Application	0.12
Armadale	Application	0.01
Garvary	Application	0.23
Total Cumulative Effect Considering Installed or Approved Developments		**0.78**
Total Cumulative Effect Considering Installed or Approved and Application Stage Developments		**1.14**
* Listed as 'Application' on NS data, but are consented. + Not included in NS data. Although original Environmental Statement predicted collision mortality of 0.01 birds per year, no effects on golden eagle are included with the Additional Information provided in support of the consented revised scheme of fewer turbines (E.ON, 2013[51]; Atmos Consulting, 2019a[52]; Atmos Consulting, 2019b[53]). Therefore, it has been assumed there is no collision mortality predicted for golden eagles at Strathy Wood.		

The predicted cumulative effect as a result of collision mortality considering installed and approved projects is 0.78 golden eagle each year. However, the majority of the cumulative total for installed and approved projects is as a result of just two wind farm projects: Strath Tirry (0.47 birds per year) and Sallachy (2nd submission) (0.10 birds per year).

Similarly, when application stage projects are considered now, a mortality estimate of 1.14 birds per year is predicted. However, four projects are responsible for the majority of the predicted risk of collision mortality (0.92 birds per year): Strath Tirry (0.47 birds per year - approved), Garvary (0.23 birds per year - application), Achany Extension (0.12 birds per year - application), and Sallachy (2nd submission) (0.10 birds per year - approved). No currently installed wind farm predicts collision mortality of more than 0.10 per year – the highest being 0.07 (Gordonbush).

The total predicted cumulative loss of golden eagles through collision based on installed or approved wind farms over 40 years is 29.64, and when application stage projects are included, this rises to 43.32. The addition of the loss of one golden eagle every 168.70 years would not result in a measurable change to the predicted cumulative impacts of all wind farms included in **Table 8.10** over 40 years, and so**, No Significant**

[51] E.ON. 2013. *Strathy Wood Wind Farm. Environmental Statement.* Atmos Consulting Ltd.

[52] Atmos Consulting. 2019a. *Strathy Wood Wind Farm Further Environmental Information 2019. Planning Statement.* Atmos Consulting Ltd.

[53] Atmos Consulting. 2019b. *Strathy Wood Wind Farm. Further Environmental Information Volume 2: FEI 2019 Main Report.* Atmos Consulting Ltd.

Cumulative Effects are predicted on golden eagle, or the integrity of this feature of Caithness and Sutherland Peatlands SPA.

Potential Transboundary Effects

In the context of the proposed development, effects on golden eagles would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant impact is predicted on golden eagles, or the associated conservation objectives of Caithness and Sutherland Peatlands SPA.

Merlin

As merlin are a qualifying feature of Caithness and Sutherland Peatlands SPA, and listed under Schedule 1 of the Wildlife and Countryside Act, they are considered to be of very high importance. Merlin are also included on the SBL and are Red listed.

Baseline

Due to their sensitivity, additional details informing the merlin assessment can be found in the **Confidential Annex**. However, a general summary is provided in the assessment below.

A single merlin territory was found during 2013 surveys (see **Confidential Annex**). Historic records provided by RSPB indicated that merlin had been observed to display breeding behaviour in the same area historically, and so it is likely that this relates to the same territory. This territory is considered to be associated with the Caithness and Sutherland Peatlands SPA.

Merlin were not observed to forage or overfly the application site boundary during flight activity surveys in 2012 and 2013.

Merlin were not recorded during post-consent monitoring, which was undertaken within 1km of the CRWF construction site (Natural Power data).

The Caithness and Sutherland Peatlands SPA supports a population of 54 breeding pairs of merlin. This territory will be considered within this context.

Potential Construction Effects

The merlin nest site identified in 2013 was more than 500m from any proposed development, which is the recommended buffer to avoid disturbance to this species (Goodship & Furness, 2022). Therefore, **No Effects** are predicted on breeding merlin as a result of disturbance during construction.

Furthermore, the site and surrounding area offers poor foraging and nesting habitat for merlin, due to the degraded nature of the peatland habitats. Optimal foraging and nesting habitat is found closer to the nest site, and in the opposite direction from the wind farm. Therefore, the proposed development would not result in the loss of important potential foraging or nesting habitat.

Therefore, **No Significant Effect** is predicted on merlin.

Potential Operational Effects

Merlin were not observed during flight activity surveys in 2012 and 2013. However, merlin are cryptic small birds and detection rates are considered to be low, with detection rates dropping dramatically beyond 1km. Although they often hunt below collision risk height, aerial pursuit of passerines would place them within potential collision risk height. In this case, the site offers neither good foraging nor nesting habitat, with limited prey, and so any potential risk of collision is considered trivial. Therefore, there is the potential for an effect of negligible magnitude. Therefore, **No Significant Effect** is predicted on merlin as a result of collision with turbines.

However, the proposed BERP would improve the quality of peatlands north of the application site boundary. This would provide improved habitat structure for nesting and foraging opportunities for merlin in this area to the north of the proposed wind farm, and would benefit the species. As such, a long-term positive effect of medium magnitude. Therefore, the proposed development is predicted to have a **Significant** positive effec**t** on merlin.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on merlin would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant negative impact is predicted on merlin or the associated conservation objectives of Caithness and Sutherland Peatlands SPA.

Hen Harrier

As hen harriers are a qualifying feature of Caithness and Sutherland Peatlands SPA, and listed under Schedules 1 and 1A of the Wildlife and Countryside Act, they are considered to be of very high importance. Hen harrier are also included on the SBL and are Red listed.

Baseline

No hen harriers were observed during flight activity surveys during 2012 and 2013, and no territories were found.

However, a single flight of an immature bird was observed during the Preliminary Ecological Appraisal Site Visit in 2012, over 4km north of the nearest proposed extension turbine.

Hen harriers were not recorded during post-consent monitoring, which was undertaken within 1km of the CRWF construction site (Natural Power data).

The Caithness and Sutherland Peatlands SPA supports a population of 14 breeding pairs of hen harriers. However, it is not possible to be certain that this immature bird is associated with this SPA. The Peatlands of Caithness and Sutherland NHZ is thought to support 35 to 40 breeding pairs.

Potential Construction Effects

No hen harrier territories were found within the application site boundary or in the wider area during surveys in 2013, or post-consent monitoring. Furthermore, the habitat within the proposed development site is suboptimal for foraging, nesting or roosting hen harriers. Therefore, **No Effects** are predicted on hen harriers as a result of disturbance during construction.

Potential Operational Effects

Hen harriers were not observed during flight activity surveys. In 2012 and 2013. However, a single immature hen harrier was observed during the Preliminary Ecological Appraisal Site Visit on 28 August 2013. This flight followed the Allt na h-Aire burn, over 4km north of the nearest extension turbine and was below potential collision height. Therefore, there would be no risk of collision to hen harriers, had this flight been recorded during flight activity surveys and appropriate for inclusion in collision risk modelling. The site itself offers poor foraging, nesting or roosting habitat and so is unlikely to be used by this species. Therefore, hen harriers are unlikely to use the site with any regularity, and any potential collision risk would be trivial as evidenced by

baseline surveys. Therefore, there is the potential for an effect of negligible magnitude. Therefore, **NoSignificantEffect** is predicted on hen harriers as a result of collision with turbines.

However, the proposed BERP would improve the quality of peatlands north of the application site boundary. This would provide improved habitat structure for nesting and foraging opportunities for hen harrier in this area to the north of the proposed wind farm and would benefit the species. As such, a long-term positive effect of medium magnitude. Therefore, the proposed development is predicted to have a **Significant** positive effect on hen harrier.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on hen harriers would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant negative impact is predicted on hen harrier or the associated conservation objectives of Caithness and Sutherland Peatlands SPA.

Dunlin

As dunlin is a qualifying feature of Caithness and Sutherland Peatlands SPA they are considered to be of very high importance. Dunlin are also included on the SBL and are Red listed.

Baseline

A single dunlin flight was recorded over 2km to the north of the application site boundary during 2012 and 2013 flight activity surveys.

The nearest dunlin territory recorded was over 2.5km north of the proposed development.

Dunlin were not recorded during post-consent monitoring, which was undertaken within 1km of the CRWF construction site (Natural Power data).

Potential Construction Effects

No dunlin were found to breed at or near the site, and so **No Effect** is predicted as a result of disturbance during construction.

However, a preconstruction survey would be undertaken to determine whether any upland waders are breeding within 500m of the construction footprint. If any waders are found to breed, a 200m buffer would be used for dunlin (Goodship & Furness, 2022). Construction activities are restricted or prohibited within buffer areas as appropriate until breeding is shown to have ended. A watching brief would be maintained by the ECoW. Any impact on breeding dunlin is considered highly unlikely with mitigation in place. Any impact would be of negligible magnitude, reversible in the short-term. Therefore, **No Significant Effect** is predicted.

Potential Operational Effects

Only a single dunlin flight was recorded during flight activity surveys, and this was over 2km north of the nearest extension turbine. This flight was not recorded at either VP2 or 3. Therefore, **No Significant** effect is predicted as a result of collision with turbines for dunlin.

However, the proposed BERP would improve the quality of peatlands north of the application site boundary. This would provide improved habitat structure for nesting and foraging opportunities for dunlin in this area to the north of the proposed development and would benefit the species. As such, a long-term positive effect of medium magnitude. Therefore, the proposed development is predicted to have a **Significant** positive effect on dunlin.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on dunlin would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant negative impact is predicted on dunlin or the associated conservation objectives of Caithness and Sutherland Peatlands SPA.

Greenshank

As greenshank is a qualifying feature of Caithness and Sutherland Peatlands SPA they are considered to be of very high importance. Greenshank are also listed under Schedule 1 of the Wildlife and Countryside Act. Greenshank are also included on the Amber list.

Baseline

Greenshank were observed foraging at bog pools and in wetter areas of bog habitat to the north of the CRWF site during 2013 (outwith both the CRWF and proposed development), and two breeding territories were recorded in 2022 during post-consent monitoring (Creag Riabhach Wind Farm Ltd, 2013; Natural Power data). However, the nearest recorded territory was located 1.3km from the nearest proposed extension turbine. Observed flights were also restricted to this area.

Potential Construction Effects

No greenshank were found to breed at or near the site, and so **No Effect** is predicted as a result of disturbance during construction.

However, a preconstruction survey would be undertaken to determine whether any upland waders are breeding within 500m of the construction footprint. If any waders are found to breed, a 500m buffer would be used for greenshank (Goodship & Furness, 2022). Construction activities are restricted or prohibited within buffer areas as appropriate until breeding is shown to have ended. A watching brief would be maintained by the ECoW. Any impact on breeding greenshank is considered highly unlikely with mitigation in place. Any impact would be of negligible magnitude, reversible in the short-term. Therefore, **No Significant Effect** is predicted.

Potential Operational Effects

No greenshank flights were recorded during flight activity surveys. and a flight recorded during post-consent monitoring in 2022 was 1.5km north of the nearest extension turbine. Therefore, **No Significant Effect** is predicted as a result of collision with turbines for greenshank.

However, the proposed BERP would improve the quality of peatlands north of the application site boundary. This would provide improved habitat structure for nesting and foraging opportunities for greenshank in this area to the north of the proposed wind farm, and would benefit the species. As such, a long-term positive effect of medium magnitude. Therefore, the proposed development is predicted to have a **Significant** positive effect on greenshank.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on greenshank would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant negative impact is predicted on greenshank or the associated conservation objectives of Caithness and Sutherland Peatlands SPA.

Golden Plover

As golden plover is a qualifying feature of Caithness and Sutherland Peatlands SPA they are considered to be of very high importance. Golden plover are also included on the SBL.

Baseline

Three golden plover territories were confirmed during 2013 surveys, with the nearest located over 2km north of the proposed development (Creag Riabhach Wind Farm Ltd, 2013). Golden plover were also recorded during post-consent monitoring, with the closest territory being located over 1.4km from the nearest extension turbine (Natural Power data).

A single golden plover flight was recorded at potential collision height during 2012 and 2013 flight activity surveys.

Potential Construction Effects

No golden plover were found to breed at or near the site, and so, **No Effect** is predicted as a result of disturbance during construction.

However, a preconstruction survey would be undertaken to determine whether any upland waders are breeding within 500m of the construction footprint. If any waders are found to breed, a 500m buffer would be used for golden plover (Goodship & Furness, 2022). Construction activities are restricted or prohibited within buffer areas as appropriate until breeding is shown to have ended. A watching brief would be maintained by the ECoW. Any impact on breeding golden plover is considered highly unlikely with mitigation in place. Any impact would be of negligible magnitude, reversible in the short-term. Therefore, **No Significant** Effect is predicted.

Potential Operational Effects

A single random golden plover flight was observed during 2013 surveys, at potential collision risk height (see **Figure 8.7**). Full details of collision risk modelling are provided in **Technical Appendix 8.1.**

As the golden plover flight was recorded in May, it could relate to spring migration or breeding. Therefore, a precautionary approach was adopted, and modelling undertaken assuming the same level of flight activity is possible at any time during spring migration or breeding season.

The accepted 98% avoidance rate has been used in collision risk calculations for golden plover (NS, 2018). Using the weighted average activity rate yields an estimated mortality of one bird every 1,088.27 years or 0.00 per year, which is less than one golden plover during the operational life (40 years) of the wind farm. This is a negligible effect and would not affect the integrity of the breeding population or Caithness and Sutherland Peatlands SPA conservation objectives. As such the effect of collision on golden plover is considered to be of negligible magnitude and reversible within the short- to medium-term. Therefore, **No Significant Effect** is predicted.

However, the proposed BERP would improve the quality of peatlands north of the application site boundary. This would provide improved habitat structure for nesting and foraging opportunities for golden plover in this area to the north of the proposed wind farm, and would benefit the species. As such, a long-term positive effect of medium magnitude. Therefore, the proposed development is predicted to have a **Significant** positive effect on golden plover.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on golden plover would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant negative impact is predicted on golden plover or the associated conservation objectives of Caithness and Sutherland Peatlands SPA.

8.6.5 Ecological Features of High Importance

Pink-footed Goose

Although there are no SPAs designated for pink-footed geese within the maximum 20km connectivity distance (Pendlebury *et al.,* 2011[54]; SNH, 2016) the majority of all migratory wildfowl will at some point visit an SPA in the UK. Therefore, pink-footed geese are considered to be of high importance for the purposes of this assessment. Pink-footed geese are also included on the Amber List.

Baseline

Pink-footed geese were found to overfly the site during flight activity surveys completed between 2012 and 2013 (see **Figure 8.8**).

The estimated wintering population of pink-footed geese in the UK has increased from 90,000 in 1981-84 to over 350,000 in 2009 (Mitchell *et al.*, 2010)[55].

Potential Construction Effects

There is no suitable roosting of foraging habitat onsite or nearby and so, **No Effects** are predicted during the construction phase.

Potential Operational Effects

As pink-footed geese were recorded to overfly the proposed development at potential collision height, collision risk modelling was undertaken. Full details of collision risk modelling are provided in **Technical Appendix 8.1**.

The accepted 99.8% avoidance rate has been used in collision risk calculations for pink-footed goose (NS, 2018). The weighted average activity rate yields a slightly lower estimated mortality of one bird every 8.82 years or 0.11 per year, which is approximately four pink-footed geese over the 40 year operational life of the wind farm. Therefore, in the worst-case scenario four pink-footed geese may be lost during the operational life of the wind farm, which is equivalent to <0.01% of the wintering population. The estimated survival rate between 1993 and 2002 was 84%, giving a baseline mortality of 26% (Trinder *et al*., 2005)[56]. Assuming a 26%

[54] Pendlebury, C., Zisman, S., Walls, R., Sweeney, J., McLoughlin, E., Robinson, C., Turner, L. & Loughrey, J. 2011. *Literature review to assess bird species connectivity to Special Protection Areas.* Scottish Natural Heritage Commissioned Report No. 390. SNH.

[55] Mitchell, C., Colhoun, K., Fox, A.D., Griffin, L., Hall, C., Hearn, R., Holt, C. & Walsh, A. 2010. Trends in goose numbers wintering in Britain & Ireland, 1995-2008. *Ornis Svecica* **20**, 128-143.

[56] Trinder, M., Rowcliffe, M., Pettifor, R., Rees, E., Griffin, L., Ogilview, M. & Percical, S. 2005. *Status and population viability analyses of geese in Scotland. Scottish Natural Heritage Commissioned Report No. 107 (ROAME No. F03AC302).* SNH, Inverness.

mortality rate and a population of 350,000 pink-footed geese it would be expected that 87,500 would be lost per year. The proposed development would result in a baseline mortality increase of much less than 0.01%. This is a negligible effect and would not affect the integrity of the UK wintering population. As such the effect of collision on pink-footed geese is considered to be of negligible magnitude. Therefore, **No Significant Effect** is predicted.

In addition, post-construction research has demonstrated that geese avoid wind farms, and that the vast majority of geese skeins adjust their flight paths by diverting around the site or increasing their altitude to fly over the turbines above potential collision height (Pawel & Simms, 2012[57]; Lindeboom *et al.*, 2011[58]; Madsen & Boertmann, 2008[59]; Patterson, 2006[60]; Desholm & Kahlert, 2005[61]; Larson & Madsen, 2000[62]). While this reduces the risk of collision to a negligible level, it can increase the energetic expenditure associated with the flight path (Drewitt & Langston, 2006)[63]. The proposed development is not in the path of a predictable flight route, regular changes resulting in significant additional energy expenditure is not expected. Furthermore, a study using mortality data from wind farms globally found that Anseriforms (which include pink-footed geese) were of relatively lower risk of collision than many other groups of birds (Thaxter *et al.*, 2017)[64]. Therefore, the collision estimates presented here are considered highly precautionary and in reality the effect on pink-footed geese is likely to be very small.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

[57] Pawel, P & Simms, I.C. 2012. Radar monitoring of migratory pink-footed geese: behavioural responses to offshore development. *Journal of Applied Ecology* **49**, 1187-1194.

[58] Lindeboom, H.J., Kouwenhoven, H.J., Bergman, M.J.N, Bouma, S., Basseur, S., Daan, R., Fijn, R.C., de Haan, D., Dirksen, S., van Hal, R., Lambes, H.R., ter Hofsted, R., Krijgsveld, K.L., Leopold, M. & Scheidal, M. 2011. Short-term ecological effects of an offshore wind farm in the Dutch coastal zone; a compilation. *Environmental Research Letters* **6**, 1-13.

[59] Madsen, J. & Boertmann, D. 2008. Animal behavioural adaptation to changing landscapes: spring-staging geese habituate to wind farms. *Landscape Ecology* **23**, 1007-1011.

[60] Patterson, I.J. 2006. *Geese and wind farms in Scotland*. Report to SNH. SNH.

[61] Desholm, M. & Kahlert, J. 2005. Avian collision risk at an offshore wind farm. *Biology Letters* **1**, 296-298.

[62] Larson, J.K. & Madsen, J. 2000. Effects of wind turbines and other physical elements on field utilization by pink-footed geese (*Anser brachyrhynchus*): a landscape perspective. *Landscape Ecology* **15**, 755-764.

[63] Drewitt, A.L. & Langston, R.H.W. 2006. Assessing the impacts of wind farms on birds. *Ibis* **148** 29-42.

[64] Thaxter, C.B., Buchanan, G.M., Carr, J., Butchart, S.H.M., Newbold, T., Green, R.E., Tobias, J.A., Foden, W.B., O'Brien, S. & Pearch-Higgins, J. W. 2017. Bird and bat species' global vulnerability to collision mortality at wind farms revealed through trait-based assessment. *Proceedings of the Royal Society B.* **284**, 20170829.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on pink-footed geese would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant impact is predicted on pink-footed geese or the conservation objectives of any associated SPAs.

Greylag Goose, Barnacle Goose, and Whooper Swan

Although there are no SPAs designated for geese or swans within the maximum 20km connectivity distance (Pendlebury *et al.,* 2011; SNH, 2016), as the majority of all migratory wildfowl will at some point visit an SPA in the UK, greylag geese, barnacle geese, and whooper swans are considered to be of high importance for the purposes of this assessment. All three species are included on the Amber List, while barnacle goose and whooper swan are also included on the SBL.

Baseline

A single skein of 110 greylag geese was observed at potential collision height during 2012 and 2013 surveys (see **Figure 8.9**). However, this flight followed the Vagastie valley, and was nearly 1km from the nearest extension turbine location.

A single skein of five barnacle geese was observed during 2012 and 2013 surveys (Creag Riabhach Wind Farm Ltd, 2013). However, this flight was nearly 3km from the nearest extension turbine location.

A single flight of two whooper swans was observed to follow a path that almost certainly did overfly the site (see **Figure 8.10**).

Potential Construction Effects

There is no suitable roosting of foraging habitat onsite or nearby and so **No Effects** are predicted during the construction phase.

Potential Operational Effects

A single skein of 110 greylag geese was observed at potential collision height during 2012 and 2013 surveys (see **Figure 8.9**). However, this flight followed the Vagastie valley, and was nearly 1km from the nearest

extension turbine location. Other flights are likely to follow this valley as a predictable flight path, although this would appear to be irregularly used based on available observations. Even if greylag geese were to occasionally overfly the site at potential collision height, this would be highly unlikely based on observations and any measurable impact on the population would be highly improbable. Therefore, **No Effects** are predicted for greylag geese.

A single skein of five barnacle geese was observed during 2012 and 2013 surveys (Creag Riabhach Wind Farm Ltd, 2013). However, this flight was nearly 3km from the nearest extension turbine location, and was not at potential collision height. Even if barnacle geese were to occasionally overfly the site at potential collision height, this would be incredibly rare based on observations and any measurable impact on the population would be highly unlikely. Therefore, **No Effects** are predicted for barnacle geese.

A single flight of two whooper swans was observed to follow a path that almost certainly did overfly the site (see **Figure 8.10**). However, this was not at potential collision height. Even if whooper swans were to occasionally overfly the site at potential collision height, this would be incredibly rare based on observations and any measurable impact on the population would be highly unlikely. Therefore, **No Effects** are predicted for whooper swan.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on greylag geese, barnacle geese, or whooper swans would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant impact is predicted on greylag geese, barnacle geese, or whooper swans, or the conservation objectives of any associated SPAs.

Peregrine

As peregrines are listed under Schedule 1 of the Wildlife and Countryside Act, they are considered to be of high importance. They are also included on the SBL.

Baseline

Due to their sensitivity, additional details informing the peregrine assessment can be found in the **Confidential Annex**. However, a general summary is provided in the assessment below.

A single peregrine territory was found during baseline surveys in 2012 and 2013 (see **Confidential Annex**). Historic records provided by RSPB indicated that peregrines had been observed to display breeding behaviour in the same area historically, and so it is likely that this relates to the same territory.

Peregrines were not observed to forage or overfly the site. A single flight was recorded 3km north of the nearest extension turbine location (Creag Riabhach Wind Farm Ltd, 2013).

The Peatlands of Caithness and Sutherland NHZ is considered to support a population of 15 peregrine breeding territories, and this territory will be considered in this context, although the real population in the area may well be higher (Wilson *et al.*, 2015)[65].

Potential Construction Effects

The peregrine nest site identified was more than 750m from any proposed development, which is the recommended buffer to avoid disturbance to this species (Goodship & Furness, 2022). Therefore, **No Effect** is predicted on breeding peregrine as a result of disturbance during construction.

Furthermore, the site and surrounding area does not offer suitable breeding habitat for peregrine, and only offers poor foraging habitat due to the degraded nature of the peatland habitats. Optimal foraging and nesting habitat is found closer to the nest site, and in the opposite direction from the wind farm. Therefore, the proposed development would not result in the loss of important potential foraging or nesting habitat, and **No Effect** is predicted as a result of loss of habitat.

Potential Operational Effects

Peregrine were not observed during flight activity surveys in 2012 and 2013, and the site offers neither good foraging nor nesting habitat. Therefore, peregrine are unlikely to forage over the site with any regularity, and any potential collision risk would be trivial. Therefore, there is the potential for an effect of negligible magnitude, and **No Significant Effect** is predicted on peregrine as a result of collision with turbines.

The BERP would enhance habitat to the north of the site, increasing its suitability for foraging peregrines, which would have a long-term positive effect of medium magnitude.

[65] Wilson, M.W., Austin, G.E., Gillings S. & Wernham, C.V. 2015. *Natural Heritage Zone Bird Population Estimates. SWBSG Commissioned report number SWBSG_1504.* Scottish Windfarm Bird Steering Group (SWBSG), Edinburgh.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on peregrine would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No significant impact is predicted on peregrine.

Barn Owl

As barn owls listed under Schedule 1 of the Wildlife and Countryside Act, and are included on the SBL. They are less common in Caithness and Sutherland than elsewhere in Scotland, likely due to limited nesting opportunities. They are therefore considered to be of high importance.

Baseline

Due to their sensitivity, additional details informing the barn owl assessment can be found in the Confidential Annex. However, a general summary is provided in the assessment below.

No barn owls were observed during flight activity surveys, and no nests were found. However, a single barn owl roost was found during 2012 and 2013 surveys (see **Confidential Annex**).

No barn owls were recorded during post-consent monitoring, which was undertaken within 1km of the CRWF construction site (Natural Power data).

Potential Construction Effects

The barn owl roost site identified was several kilometres from the proposed development, which is much further than the recommended 100m buffer distance to avoid disturbance to this species (Goodship & Furness, 2022). Therefore, **No Effects** are predicted on roosting barn owl as a result of disturbance during construction.

Furthermore, the site and surrounding area does not offer suitable breeding habitat for barn owl, and only offers poor foraging habitat due to the degraded nature of the peatland habitats. Optimal foraging and nesting habitat is found closer to the roost site, and in the opposite direction from the wind farm. Therefore, the proposed development would not result in the loss of important potential foraging or nesting habitat. The proposed development would not result in the loss of important potential foraging habitat, and so **No Effect** is predicted as a result of loss of habitat.

Potential Operational Effects

Barn owls were not observed during flight activity surveys and the site offers neither good foraging nor nesting habitat. Therefore, barn owls are unlikely to forage or commute over the site with any regularity. Furthermore, barn owls typically fly at altitudes (<4m) which are much lower than potential collision height while foraging and so any potential collision risk would be trivial (Barn Owl Trust, 2012)[66]. Therefore, there is potential, for an effect of negligible magnitude, although this is highly unlikely. Therefore, **No Significant Effect** is predicted on barn owl as a result of collision with turbines.

The BERP would enhance habitat to the north of the site, increasing its suitability for foraging barn owls, which would have a long-term positive effect of medium magnitude.

Furthermore, as part of the BERP, up to six barn owl nest boxes would be installed at suitable locations, to be agreed with an appropriately experienced ornithologist, so as to increase the likelihood of this species breeding in the area, which may have a long-term positive effect of low to medium magnitude.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on barn owls would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant impact is predicted on barn owls.

[66]Barn Owl Trust. 2012. *Barn Owl Conservation Handbook*. Pelagic Publishing, Exeter.

8.6.6 Ecological Features of Medium Importance

Black Grouse

Black grouse have suffered a 29% population decline in Scotland over the last 25 years, with a 16% decline in north Scotland (Sim *et al.,* 2008) and are listed on the SBL and are Red Listed. The leks in the vicinity of the proposed development are the most northerly known in the UK. Black grouse are, therefore, considered to be of medium importance.

Baseline

Due to their sensitivity, additional details informing the black grouse assessment can be found in the **Confidential Annex**. However, a general summary is provided in the assessment below.

Three black grouse lek sites were found during baseline surveys in 2013 (see **Confidential Annex**). Historic records provided by Altnaharra Estate and RSPB indicated that black grouse have been known to lek in the same area historically, indicating two lek sites which correspond with those found during the novel surveys in 2013. Only a maximum of a single male black grouse was observed at each of the three lek sites identified. A female black grouse was also observed at one lek site.

A single black grouse flight was recorded within the site, very low to the ground, below potential collision risk height (see **Confidential Annex**).

No black grouse were recorded during post-consent monitoring, which was undertaken within 1km of the CRWF construction site (Natural Power data). This suggests that the nearest lek site is no longer in use.

The most recent estimate of lekking males in north Scotland is 770 birds, and these leks would be considered in this context (Sim *et al.*, 2008)[67].

Potential Construction Effects

Based on 2013 surveys, only one lek site was located within the recommended 750m disturbance buffer (Goodship & Furness, 2022). However, this lek site was not found to be in use during post-consent monitoring for the existing CRWF (Natural Power data). It is considered likely that the same male was utilising each of the three lek sites recorded in 2013 as there were no mornings where black grouse were observed at more than one lek site. It should be noted that research has shown black grouse to be initially tolerant of wind farm related disturbance, lekking within 200m (with clear disturbance occurring at 100m), but become

[67] Sim, I.M.W., Eaton, M.A., Setchfield, R.P., Warren, P.K. & Lindley, P. 2008. Abundance of male black grouse *Tetrao tetrix* in Britain in 2005, and change since 1995-96. *Bird Study* **55**, 304-313.

displaced over time (Zeiler & Grünschachner-Berger, 2009)[68]. It is, therefore, considered likely that black grouse have been displaced from the nearest lek site, and are using the other lek locations situated further away to the south and north of the proposed development. It should also be noted that the nearest lek site identified in 2013 is not the most northerly known lek in the UK.

As the lek site within the recommended disturbance distance is no longer in use, **No Effect** is predicted on black grouse as a result of construction activities.

However, as it is possible black grouse may again use the nearest lek site in the future, precautionary mitigation is recommended. Pre-construction surveys would be undertaken for black grouse, and a watching brief maintained by the ECoW. If possible, construction activities within 750m of both of the lek site would be avoided between March and May inclusive to avoid disturbance. Where this is not possible, construction activities would not take place during dusk (one hour before sunset until one hour after) and dawn (one hour before sunrise until one hour after) between March and May, which would avoid disturbance to black grouse using the lek sites. A detailed method statement would be produced and agreed prior to construction activities.

Although the above mitigation is expected to avoid any negative effects on black grouse during construction, in the unlikely event that this was unsuccessful the worst-case scenario would result in the temporary displacement of one lekking black grouse during a single season. Were this black grouse to fail to find an alternative lek site, this would result in the temporary loss of a single lekking bird for one year. This would be equivalent to a much less than 0.01% loss to the lekking population of black grouse for a single year. Therefore, in the worst-case, there may be a negative effect of negligible magnitude and reversible in the short-term. Therefore, **No Significant** effect is predicted**,** and it is expected that mitigation measures would avoid any insignificant negative effects as well.

The proposed development site offers poor habitat for foraging black grouse, evidenced by the extremely low levels of activity within the application site. Although the Ordnance Survey mapping for the area indicates there is plantation forestry within a small part of the site, this is in fact degraded bog habitat consistent with the majority of the site, with only scattered stunted scrub (see **Chapter 6: Terrestrial Ecology**). However, more establish mixed plantation can be found at the base of the slope, nearest the road, and would not be affected by the proposed development. Therefore, the nature of the habitat surrounding the nearest lek site would not be changed and **no effects** are predicted as a result of habitat loss.

Potential Operational Effects

The only black grouse flight observed in 2013 was very close to the ground, and below potential collision height. This is consistent with research which has found that, black grouse generally fly below potential

[68]Zeiler, H.P. & Grünschachner-Berger, V. 2009. Impact of wind power plants on black grouse, *Lyrurus textrix* in Alpine regions. *Folia Zoologica* **58**, 173-182.

collision height (Zeiler & Grünschachner-Berger, 2009). As such, any risk of collision would be extremely low, and any potential effect of negligible magnitude. Therefore, **No Significant Effect** is predicted on black grouse as a result of collision with turbines.

It should be noted that if black grouse have been displaced by the existing CRWF, there would be no risk of collision as these are mutually exclusive effects.

The proposed BERP would improve the quality of habitat north of the application site boundary. This would provide improved foraging opportunities for black grouse in this area to the north of the proposed development in the vicinity of the northernmost lek site, and would benefit the species. As such, a long-term positive effect of low magnitude is predicted.

Therefore, **No Significant** negative effects are predicted.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on black grouse would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant impact is predicted on black grouse.

Arctic Skua

As Arctic skuas are included on the SBL and Red List, they are considered to be of medium importance.

Baseline

Arctic skuas were not found to breed within the core survey area during 2012 and 2013 surveys or post-consent monitoring (Creag Riabhach Wind Farm Ltd, 2013; Natural Power data).

Two Arctic skua flights were observed on 14 September 2012. Both of these were at potential collision height and are almost certainly attributable to the same individual (see **Figure 8.11**).

Fewer than ten individuals are thought to remain in Scotland through winter (Forrester *et al.*, 2007)[69]. It is likely that those that do overwinter in Scotland were unable to migrate due to injury or illness.

Potential Construction Effects

Arctic skuas were not found to breed or use the site during breeding season in 2013 surveys or post-consent monitoring (Creag Riabhach Wind Farm Ltd, 2013; Natural Power data). Therefore, **No Effects** are predicted during construction.

Potential Operational Effects

Two Arctic skua flights were recorded during flight activity surveys in 2012, both of which were at potential collision height (see **Figure 8.11**). As it is highly likely that this flight represented a delayed migration or an individual overwintering for reasons of ill health or injury during the peak migration season, it is highly unlikely that this level of flight activity would be repeated with any regularity. It is also interesting to note that a single Arctic skua was also observed near Westfield, Caithness, in November 2012 (Chris Cathrine, pers. obs.), which may relate to the same individual. However, a precautionary approach has been adopted, and collision risk modelling was completed for Arctic skua, assuming that a similar level of activity may occur throughout winter every year (i.e., an individual bird fails to migrate, and if active in this area to a similar degree each year). Full details of collision risk modelling are provided in **Technical Appendix 8.1**.

The accepted 99.5% avoidance rate has been used in collision risk calculations for Arctic skua (NS, 2018). Using the weighted average activity rate yields an estimated mortality of one bird every 754.43 years or 0.00 per year, which is less than one Arctic skua during the operational life (40 years) of the wind farm. As such the effect of collision on Arctic skua is considered to be of negligible magnitude and reversible within the short- to medium-term. Therefore, **No Significant Effect** is predicted.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

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

Potential Transboundary Effects

In the context of the proposed development, effects on Arctic skua would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant impact is predicted on Arctic skua.

Cuckoo

Cuckoos are included on the SBL and are Red Listed. They are therefore considered to be of medium importance.

Baseline

Cuckoos were observed in the wider area. As cuckoos are brood parasites of meadow pipits (*Anthus pratensis*) in moorland areas, and so are considered in the context of their host species breeding population in this assessment. Breeding meadow pipits were found to be widespread with the greatest densities concentrated in the lower slopes of the Vagastie valley, and in the sheltered area on the far side of Creag Riabhach ridge north of the application site boundary (see **Figure 8.12**).

Potential Construction Effects

Studies have shown that skylark and meadow pipit densities remain stable and may in fact increase during wind farm construction (Pearce-Higgins *et al.* 2012; Langston & Pullan, 2003[70]). This may be due to the ground disturbance providing enhanced foraging opportunities for invertebrate prey. Therefore, construction activities may actually have a positive effect on cuckoo. As the site does not support important populations of cuckoo, and there is ample suitable habitat in the wider area (with the highest meadow pipit densities found to the south and north of the site, as shown in **Figure 8.12**), at worst, there may be a short-term positive effect of negligible magnitude. Therefore, **No Significant Effects** are predicted.

Potential Operational Effects

Meadow pipit densities have been found to remain the same, or are slightly reduced during operation (Pearce-Higgins *et al.*, 2012; Pearce-Higgins *et al.*, 2009). However, there are higher densities of meadow pipits found outwith the application site boundary, and the species is widespread in the wider area. Therefore, any measurable effect on meadow pipit abundance in the area is considered highly unlikely, and so there should be no shortage of hosts for breeding cuckoos. In the worst-case, there may be an effect of negligible magnitude. Therefore, **No Significant Effect** is predicted.

[70]Langston, R.H.W. & Pullan, J.D. 2003. *Windfarms and birds: an analysis of the effects of wind farms on birds, and guidance on environmental assessment criteria and site selection issues. Report T-PVS/Inf (2003)* 12. RSPB/BirdLife.

The proposed BERP would improve the quality of habitat north of the application site boundary. This would provide improved nesting opportunities for meadow pipits in this area to the north of the proposed wind farm and would benefit the cuckoo. As such**,** a long-term positive effect of low magnitude is predicted.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on cuckoo would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant impact is predicted on cuckoo**.**

Snow Bunting and Fieldfare

Although snow bunting and fieldfare are listed under Schedule 1 of the Wildlife and Countryside Act, this relates to breeding only, while these species were only observed during winter at the site. Snow bunting is also included on the SBL and Amber List, while fieldfare is included on the Red List. They are therefore considered to be of medium importance.

Baseline

Small numbers of snow bunting (46) and fieldfare (3) were observed to overfly the site in winter. They did not use the application site for foraging, roosting or breeding.

Potential Construction Effects

Although snow bunting and fieldfare both overflew the site in winter, the site does not offer good wintering habitat for these species and so they were merely in transit. Neither snow bunting nor fieldfare bred onsite. Therefore, **No Effects** are predicted on fieldfare or snow bunting during construction.

Potential Operational Effects

Conventionally, collision risk is not assessed for passerine birds due to their very low probability of collision and tendency to fly below potential collision height for the vast majority of the time. On this basis there is considered to be very little risk of turbine collisions for either of these species, and therefore, **No Significant Effects** are predicted.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on snow bunting and fieldfare would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant impact is predicted on snow bunting or fieldfare**.**

8.6.7 Ecological Features of Low Importance

Skylark

Skylark are included on the SBL and are Red Listed. However, the reason for inclusion on the Red List relates to declines in areas of arable farming where there has been a switch from spring to autumn-sown crops. The proposed development and surrounding area consists of upland habitats where skylark remain abundant. Therefore, skylark are considered to be of low importance.

Baseline

No skylark territories were found within the site, although nine are located within 500m (see **Figure 8.13**).

Potential Construction Effects

Studies have shown that skylark densities remain stable and may in fact increase during wind farm construction (Pearce-Higgins *et al.*, 2012; Langston & Pullan, 2003). This may be due to the ground disturbance providing enhanced foraging opportunities for invertebrate prey. Therefore, construction

activities may actually have a positive effect on skylark. As the site does not support skylark, and there is ample suitable habitat in the wider area, at worst, there may be a short-term effect of negligible magnitude on territories within the 500m buffer. Therefore, N**o Significant Effects** are predicted.

Potential Operational Effects

Skylark densities have been found to be higher at operational wind farms than the preconstruction baseline, and at worst are only marginally affected within 200m of turbines (Pearce-Higgins *et al.*, 2012; Pearce-Higgins *et al.*, 2009). Therefore, in the worst-case any effect would be of negligible magnitude. As such, **No Significant Effect** is predicted.

Conventionally, collision risk is not assessed for passerine birds due to their very low probability of collision and tendency to fly below potential collision height for the vast majority of the time. On this basis there is considered to be very little risk of turbine collisions for this species, and therefore **No Significant Effects** are predicted.

The proposed BERP would improve the quality of habitat north of the application site boundary. This would provide improved nesting opportunities for skylark in this area to the north of the proposed development and would benefit the cuckoo. As such**,** a long-term positive effect of low magnitude is predicted.

Potential Decommissioning Effects

Decommissioning effects are predicted to be of a similar nature to construction effects. Therefore, **No Effect** is predicted.

Potential Cumulative Effects

As no measurable negative effect is predicted, **No Cumulative Effects** are predicted.

Potential Transboundary Effects

In the context of the proposed development, effects on skylark would be localised within one administrative region, and no pathway for transboundary effects has been identified.

Impact

No Significant impact is predicted on snow skylark.

8.7 Biodiversity Enhancement and Restoration Plan and Monitoring

The BERP (**Technical Appendix 6.2**) supplements the existing Peatland Habitat Restoration Plan (PHRP) (Natural Power, 2019b[71]) associated with the original CRWF. The PHRP involved offsite compensation and included the blocking of drainage ditches, restoring the water table and enhancing the peatland habitats. The PHRP area to be restored is 439.8ha, which is larger than the original CRWF boundary of 356.37ha (**Figure 3.10**). The BERP includes an extension area to the PHRP (85.76ha) as compensation for the proposed development, which encompasses approximately 35.91ha.

The BERP includes the following prescriptions which are additions to the original PHRP. These are to be secured as part of the CEMP upon consent. The additional prescription included in the BERP are:

- Peatland habitat restoration - drainage blocking and self-seeding trees and scrub removal to be included within the extension to the PHRP area, providing breeding and foraging habitat for birds associated with Caithness and Sutherland Peatlands SPA;
- Creation of boggy pools – creation of a network of boggy pools to be included within the PHRP area, the extension to the PHRP area, CRWF site boundary and the proposed development, providing foraging habitat for breeding wading birds, such as species associated with the adjacent Caithness and Sutherland Peatlands SPA including dunlin, greenshank, golden plover, and wood sandpiper; and
- Installation of up to six barn owl nest boxes within the PHRP area, the extension to the PHRP area, CRWF site boundary and the proposed development.

The BERP will enhance local biodiversity, increase habitat resilience within the wider landscape and improve connections between nature networks, in line with National Planning Framework 4. The BERP is predicted to have positive effect on habitats, invertebrates, reptiles, mammals and birds.

As stated in the BERP, the monitoring plan described within the PHRP (Natural Power, 2019b) will include the extension of the PHRP area (**Figure 3.10**).

Due to the close proximity to the existing CRWF, it is considered that monitoring already being undertaken would be sufficient for the Extension site.

8.8 Summary of Residual Impacts

Table 8.11 details the predicted effects after mitigation has been considered. As decommissioning activities are of a similar type and intensity as construction activities, the assessment considers that potential effects of decommissioning would be of a similar nature to the potential effects of construction. In the case of the proposed development, mitigation measures during construction would also apply to the decommissioning phase and so are not repeated. This is likely to be precautionary, as in practice, many of the decommissioning effects are likely to be of a smaller scale than the construction effects. **Table 8.11** summarises the effects for

[71] Natural Power. 2019b. *Creag Riabhach Wind Farm CEMP. Appendix K: Peatland Habitat Restoration Plan. Condition 13(I)*. Natural Power, Inverness.

all impacts assessed, alongside mitigation. Note that no significant residual impacts are predicted that would affect the integrity of notified features or conservation objectives of designated sites provided the mitigation summarised in **Table 6.13** is implemented.

Table 8.11: Summary of Significant Residual Ornithology Effects Following Mitigation

Phase	Receptor	Importance	Description of Change	Mitigation Measure	Magnitude of Change	Nature of Change			Residual Significance
						Positive or Negative	Permanent or Temporary	Reversible or Irreversible	
Construction	Red- and black-throated divers	Very High	No impact is predicted.	Pre-construction surveys and watching brief by ECoW	N/A	N/A	N/A	N/A	Not significant
	Golden eagle	Very High	No impact is predicted.	Pre-construction surveys and watching brief by ECoW.	N/A	N/A	N/A	N/A	Not significant
	Merlin	Very High	No impact is predicted.	Pre-construction surveys and watching brief by ECoW.	N/A	N/A	N/A	N/A	Not significant
	Hen harrier	Very High	No impact is predicted.	Pre-construction surveys and watching brief by ECoW.	N/A	N/A	N/A	N/A	Not significant
	Dunlin	Very High	Displacement from nest sites or foraging areas.	Pre-construction surveys and watching brief by ECoW.	Negligible	Negative	Temporary	Reversible	Not significant
	Greenshank	Very High	Displacement from nest sites or foraging areas.	Pre-construction surveys and watching brief by ECoW.	Negligible	Negative	Temporary	Reversible	Not significant
	Golden plover	Very High	Displacement from nest sites or foraging areas.	Pre-construction surveys and watching brief by ECoW.	Negligible	Negative	Temporary	Reversible	Not significant
	Pink-footed goose	High	No impact is predicted.	N/A	N/A	N/A	N/A	N/A	Not significant
	Greylag goose, barnacle goose, and whooper swan	High	No impact is predicted.	N/A	N/A	N/A	N/A	N/A	Not significant
	Peregrine	High	No impact is predicted.	Pre-construction surveys and watching brief by ECoW.	N/A	N/A	N/A	N/A	Not significant
	Barn owl	High	No impact is predicted.	Pre-construction surveys and watching brief by ECoW.	N/A	N/A	N/A	N/A	Not significant
	Black grouse	Medium	Displacement from lek site	Pre-construction surveys and watching brief by ECoW. Avoid construction between March and May within 750m of lek sites if possible. No construction activities during dusk (one hour before sunset until one hour after) and dawn (one hour before	Negligible	Negative	Temporary	Reversible	Not significant

Phase	Receptor	Importance	Description of Change	Mitigation Measure	Magnitude of Change	Nature of Change			Residual Significance
						Positive or Negative	Permanent or Temporary	Reversible or Irreversible	
				sunrise until one hour after) between March and May.					
	Arctic skua	Medium	No impact is predicted.	Pre-construction surveys and watching brief by ECoW.	N/A	N/A	N/A	N/A	Not significant
	Cuckoo	Medium	Reduction in availability of host species through displacement.	Pre-construction surveys and watching brief by ECoW.	Negligible	Negative	Temporary	Reversible	Not significant
	Snow bunting and fieldfare	Medium	No impact is predicted.	Pre-construction surveys and watching brief by ECoW.	N/A	N/A	N/A	N/A	Not significant
	Skylark	Low	Displacement through disturbance.	Pre-construction surveys and watching brief by ECoW.	Negligible	Negative	Temporary	Reversible	Not significant
Operation	Red- and black-throated divers	Very High	No impact is predicted.	N/A	N/A	N/A	N/A	N/A	Not significant.
	Golden eagle	Very High	Collision mortality.	N/A	Negligible	Negative	Temporary	Reversible	Not significant.
			BERP	N/A	Medium	Positive	Permanent	N/A	Significant.
	Merlin	Very High	Collision mortality	N/A	Negligible	Negative	Temporary	Reversible	Not significant.
			BERP	N/A	Medium	Positive	Permanent	N/A	Significant.
	Hen harrier	Very High	Collision mortality	N/A	Negligible	Negative	Temporary	Reversible	Not significant.
			BERP	N/A	Medium	Positive	Permanent	N/A	Significant.
	Dunlin	Very High	No impact is predicted.	N/A	N/A	N/A	N/A	N/A	Not significant.
			BERP	N/A	Medium	Positive	Permanent	N/A	Significant.
	Greenshank	Very High	No impact is predicted.	N/A	N/A	N/A	N/A	N/A	Not significant.
			BERP	N/A	Medium	Positive	Permanent	N/A	Significant.
	Golden plover	Very High	Collision mortality.	N/A	Negligible	Negative	Temporary	Reversible	Not significant.
			BERP	N/A	Medium	Positive	Permanent	N/A	Significant.
	Pink-footed goose	High	Collision mortality.	N/A	Negligible	Negative	Temporary	Reversible	Not significant.
	Greylag goose, barnacle goose, and whooper swan	High	No impact is predicted.	N/A	N/A	N/A	N/A	N/A	Not significant
	Peregrine	High	Collision mortality	N/A	Negligible	Negative	Temporary	Reversible	Not significant.
			BERP	N/A	Medium	Positive	Permanent	N/A	Significant.
	Barn owl	High	Collision mortality	N/A	Negligible	Negative	Temporary	Reversible	Not significant.
			BERP	N/A	Medium	Positive	Permanent	N/A	Significant.
			Barn owl nest boxes	N/A	Medium	Positive	Permanent	N/A	Significant.
	Black grouse	Medium	Collision mortality	N/A	Negligible	Negative	Temporary	Reversible	Not significant.
			BERP	N/A	Low	Positive	Permanent	N/A	Not significant.
	Arctic skua	Medium	Collision mortality.	N/A	Negligible	Negative	Temporary	Reversible	Not significant.
	Cuckoo	Medium	Reduction in availability of host species.	Pre-construction surveys and watching brief by ECoW.	Negligible	Negative	Temporary	Reversible	Not significant
			BERP	N/A	Low	Positive	Permanent	N/A	Not significant.
	Snow bunting and fieldfare	Medium	No impact is predicted.	N/A	N/A	N/A	N/A	N/A	Not significant

Phase	Receptor	Importance	Description of Change	Mitigation Measure	Magnitude of Change	Nature of Change			Residual Significance
						Positive or Negative	Permanent or Temporary	Reversible or Irreversible	
	Skylark	Low	Displacement through disturbance.	N/A	Negligible	Negative	Temporary	Reversible	Not significant
			BERP	N/A	Low	Positive	Permanent	N/A	Not significant.
The potential effects upon avian ecology during the Decommissioning phase would be analogous with, or likely less than, those of the Construction phase. Therefore, no significant effects are predicted.									

8.9 Statement of Significance

Climate change is widely accepted as the cause of some adverse ecological events and predictions indicate that declines would occur in many habitat types and ecological taxa. Furthermore, *Scottish Biodiversity Strategy 2022 to 2045. Tackling the Nature Emergency in Scotland,* recognizes the important role of renewable energy in tackling this crisis, whilst emphasising the importance of halting and reversing biodiversity loss. It is also important in the decision-making process to consider the positive contribution that the proposed development would have in tackling the issue of climate change.

An assessment has been made of the likely effects of the proposed development, during the construction, operation and decommissioning stages. It is concluded that, provided best practice is followed to avoid disturbance to protected species, pollution, run off, sedimentation and other potential environmental effects during construction there would be no likely significant effects on any avian important ecological feature. Mitigation is recommended to minimise potential effects on important ecological features identified. After mitigation is considered, the effect on important ecological features is assessed as not significant.

The BERP will involve an increase to the restoration area to the north of the PHRP area. This increase will have a further positive effect on birds by providing breeding and foraging habitat, including those associated with Caithness and Sutherland Peatlands SPA. By increasing the available area of high quality and internationally important habitats in the vicinity of the SPA, this will help maintain the integrity of these peatlands and associated birds in the long-term. Furthermore, enhancement of the bog habitats will maximise the biodiversity potential of the extension to the PHRP area and improve habitat structure which will benefit many groups including birds. In addition, the provision of barn owl nest boxes will provide secure breeding sites for these birds. The BERP will enhance local biodiversity, increase habitat resilience within the wider landscape, and improve connections between nature networks, in line with National Planning Framework 4.

8.10 Summary

This chapter of the EIAR assesses the potential effects from the proposed development on ornithology receptors. This includes direct, indirect, potential construction, potential operational, potential decommissioning, cumulative and transboundary effects.

Caledonian Conservation Ltd undertook a detailed desk study of the existing literature and data relating to ornithology. The desk-based study was undertaken between May 2022 and January 2023. The following sources of information were used:

- Formal data searches were undertaken requesting records of eagles within 6km, and all other bird species within 2km of the proposed development site, with the following organisations: British Trust for Ornithology (BTO), Highland Raptor Study Group (HRSG), Royal Society for the Protection of Birds (RSPB), and NatureScot (NS);
- In addition to requesting HRSG data, a meeting was held with Stuart Benn (eagle coordinator), to ensure these species were appropriately considered in this assessment. This meeting focused on the

numbers, locations, and historic success of golden eagle territories, and the status of the local population;

- In addition to requesting NS data, NS Sitelink was consulted regarding designated sites of international and national importance, within 20km and 5km respectively;
- NBN Atlas was searched for relevant records using the same search areas as for formal datasearches. Only datasets with licences permitting commercial use were included in the assessment (Creative Commons Attributation Licence and Open Government Licence);
- CRWF Environmental Statement (Creag Riabhach Wind Farm Ltd, 2013 – this includes one year of flight activity surveys with at least 36 hours of observation from each Vantage Point (VP) location in each of the breeding and non-breeding seasons[72], breeding and wintering bird surveys, breeding raptor and owl surveys, breeding diver surveys, and black grouse lek surveys;
- Natural Power Updated Collision Mortality Assessment;
- Natural Power Post-consent Protected Species Monitoring and associated datasets (including breeding birds) between 2018 and 2022; and
- Anecdotal observations made during construction by ecologists working in the area.

The Golden Eagle Topographical (GET) model was used in the assessment, as recommended by NS. This model uses golden eagle telemetry data to predict use of the airspace above the landscape based on three key topographical variables: space above slopes greater than 10º, at an altitude of ≥300m, and within 300m of a ridge.

Where there has been sufficient flight activity at Potential Collision Height (PCH), collision risk modelling has been conducted following the Band Model, in accordance with NS guidance.

No novel baseline surveys have been undertaken for ornithology. However, although CRWF started commissioning in November 2022, construction activities are still taking place on-site. Any data gathered is unlikely to be representative of the baseline, as species will likely be disturbed by the construction activities. Therefore, historic data is likely to be more representative, and better suited to inform a robust assessment for the proposed development. A considerable amount of information has been gathered during work on CRWF, relevant to the assessment of the proposed development. Although surveys were undertaken using older best practice guidance, which has subsequently changed, additional information from post-consent monitoring and updated desk-based study (including a meeting with Stuart Benn, HRSG's eagle coordinator) has also been used, meaning this is unlikely to represent a significant limitation. This approach was agreed with NS.

The baseline desk study identified protected ornithological receptors, including red- and black-throated divers, golden eagle, merlin, hen harrier, dunlin, greenshank, golden plover, pink-footed goose, greylag goose, barnacle goose, whooper swan, peregrine, barn owl, black grouse, Arctic skua, cuckoo, snow bunting and fieldfare, and skylark. Several designated sites of international and national importance were also identified, notably Caithness and Sutherland Peatlands Special Protection Area (SPA) located adjacent to the proposed development.

[72] Note that only VPs 2 and 3 are relevant to the proposed development.

The following impacts were identified as requiring assessment.

- Construction and decommissioning
  - Direct habitat loss due to land-take;
  - Disturbance and damage/injury to habitats or protected species; and
  - Indirect effects on habitats or protected species (e.g. due to pollution or sedimentation).

- Operation and maintenance:
  - Collision with wind turbines;
  - Disturbance due to maintenance work which are expected to be infrequent and small scale; and
  - Indirect effects on habitats and species (e.g. pollution of watercourses as a result of spillage).

Where potential negative impacts were identified (including cumulative effects), they were all assessed to be negligible with the appropriate application of the embedded mitigation, and so not significant. Mitigation includes measures to protect habitats and species for the duration of the construction/decommissioning phases and the operational phase, while adhering to best practice and regulatory guidance. In addition, it is predicted that the proposed development is unlikely to negatively affect the conservation objectives of designated sites.

In addition, the Biodiversity Enhancement and Restoration Plan (BERP) will benefit many species of birds, notably waders and barn owl, resulting in positive effects.

8.11 References

Atmos Consulting. 2019a. *Strathy Wood Wind Farm Further Environmental Information 2019. Planning Statement.* Atmos Consulting Ltd.

Atmos Consulting. 2019b. *Strathy Wood Wind Farm. Further Environmental Information Volume 2: FEI 2019 Main Report.* Atmos Consulting Ltd.

Band, W., Madders, M. & Whitfield, D.P. 2007. Developing field and analytical methods to assess avian collision risk at wind farms. In de Lucas, M., Janss, G. and Ferrer, M. (eds.) *Birds and Wind Power*. Quercus.

Barn Owl Trust. 2001. *Survey Techniques. Leaflet No. 8*. The Barn Owl Trust, Ashburton.

Barn Owl Trust. 2012. *Barn Owl Conservation Handbook*. Pelagic Publishing, Exeter.

CIEEM. 2018. *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.2 – Updated April 2022.* Chartered Institute of Ecology and Environmental Management, Winchester.

Creag Riabhach Wind Farm Ltd. 2013. *Creag Riabhach Wind Farm Environmental Statement*. Creag Riabhach Wind Farm Ltd.

Crockford, N.J. 1992. *A review of the possible impacts of windfarms on birds and other wildlife. JNCC Report No. 27*. JNCC, Peterborough.

Desholm, M. & Kahlert, J. 2005. Avian collision risk at an offshore wind farm. *Biology Letters* **1**, 296-298.

Drewitt, A.L. & Langston, R.H.W. 2006. Assessing the impacts of wind farms on birds. *Ibis* **148** 29-42.

E.ON. 2013. *Strathy Wood Wind Farm. Environmental Statement.* Atmos Consulting Ltd.

Fielding, A.H. & Haworth, P.F. 2011. *Edinbane Wind Farm: Monitoring Report 2007-2010*. Report for Highland Regional Council.

Fielding, A.H., Haworth, P.F., Anderson, D., Benn, S., Dennis, R., Weston, E. & Whitfield, D.P. 2019. A simple topographical model to predict Golden Eagle *Aquila chrysaetos* space use during dispersal. *Ibis* **162**, 400-415.

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

Gilbert, G., Gibbons, D.W. and Evans, J. 1998. *Bird Monitoring Methods*. RSPB, Sandy.

Gill, J.P., Townsley, M. & Mudge, G.P. 1996. *Review of the impacts of wind farms and other aerial structures upon birds. Scottish Natural Heritage Review No. 21*. SNH, Edinburgh.

Goodship, N.M. & Furness, R.W. (MacArthur Green). 2022. *An updated literature review of disturbance distances of selected bird species. NatureScot Report 1283.* NatureScot.

Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. 2013. *Raptors: a field guide to survey and monitoring*, 3rd edition. SNH, Inverness.

Highland Environment Forum (HEF). 2021. *Highland Nature Biodiversity Action Plan 2021 – 2026*. Highland Environment Forum.

Hill, D., Fasham, M., Tucker, G., Shewry, M., Shaw, P. 2005. *Handbook of Biodiversity Methods.* Cambridge University Press, Cambridge.

Historic Environment Scotland & Scottish Natural Heritage. 2018. *A Handbook on Environmental Impact Assessment, 5th edition*. SNH.

Katzner, T.E., Brandes, D., Miller, T., Lanzone, M., Maisoneuve, C., Tremblay, J.A., Mulvihill, R. & Merovich Jr, G.T. 2012. Topography drives migratory flight altitude of golden eagles: implications for on-shore wind energy development. *Journal of Applied Ecology* **49** 1178-1186.

Langston, R.H.W. & Pullan, J.D. 2003. *Windfarms and birds: an analysis of the effects of wind farms on birds, and guidance on environmental assessment criteria and site selection issues. Report T-PVS/Inf (2003) 12*. RSPB/BirdLife.

Larson, J.K. & Madsen, J. 2000. Effects of wind turbines and other physical elements on field utilization by pink-footed geese (*Anser brachyrhynchus*): a landscape perspective. *Landscape Ecology* **15**, 755-764.

Lindeboom, H.J., Kouwenhoven, H.J., Bergman, M.J.N, Bouma, S., Basseur, S., Daan, R., Fijn, R.C., de Haan, D., Dirksen, S., van Hal, R., Lambes, H.R., ter Hofsted, R., Krijgsveld, K.L., Leopold, M. & Scheidal, M. 2011. Short-term ecological effects of an offshore wind farm in the Dutch coastal zone; a compilation. *Environmental Research Letters* **6**, 1-13.

Madsen, J. & Boertmann, D. 2008. Animal behavioural adaptation to changing landscapes: spring-staging geese habituate to wind farms. *Landscape Ecology* **23**, 1007-1011.

Ministry of Housing, Communities and Local Government. 2005. *Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7692/147570.pdf

Mitchell, C., Colhoun, K., Fox, A.D., Griffin, L., Hall, C., Hearn, R., Holt, C. & Walsh, A. 2010. Trends in goose numbers wintering in Britain & Ireland, 1995-2008. *Ornis Svecica* **20**, 128-143.

Natural Power. 2020a. *Creag Riabhach Wind Farm. Updated Collision Mortality Estimate.* Natural Power, Inverness.

Natural Power. 2020b. *Creag Riabhach Wind Farm CEMP. Technical Appendix J: Species Protection Plans.* Natural Power, Inverness.

NatureScot. 2018. *Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model. September 2018 v2.* NatureScot.

NatureScot. 2021. *NatureScot. Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments*. NatureScot.

NatureScot,. 2022. *SiteLink.* Available at: https://sitelink.nature.scot/home [Accessed 15/02/2023].

Orloff, S. & Flannery, A. 1996. *Avian mortality in Altamont Pass WRA – final report.* California Energy Commission, Sacramento.

Patterson, I.J. 2006. *Geese and wind farms in Scotland*. Report to SNH. SNH.

Pawel, P & Simms, I.C. 2012. Radar monitoring of migratory pink-footed geese: behavioural responses to offshore development. *Journal of Applied Ecology* **49**, 1187-1194.

Pearce-Higgins, J.W. 2021. *Climate Change and the UK's Birds.* British Trust for Ornithology, Thetford.

Pearce-Higgins, J.W., Stephen, L., Douse, A. & Langston, R.H.W. 2012. Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. *Journal of Applied Ecology* **49**, 386-394.

Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P. & Bullman, R. 2009. The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology* **46**, 1323-1331.

Pendlebury, C., Zisman, S., Walls, R., Sweeney, J., McLoughlin, E., Robinson, C., Turner, L. & Loughrey, J. 2011. *Literature review to assess bird species connectivity to Special Protection Areas.* Scottish Natural Heritage Commissioned Report No. 390. SNH.

Regini, K. 2000. Guidelines for Ecological Evaluation and Impact Assessment. *Ecology & Environmental Management In Practice, Bulletin of the Institute of Ecology and Environmental Management.* Available at: https://cieem.net/wp-content/uploads/2019/01/InPractice29sept2000.pdf

Scottish Executive. 2004. *Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland.* Scottish Executive, St Andrew's House, Edinburgh.

SNH. 2010. *Survey methods for use in assessing the impacts of onshore windfarms on bird communities*. SNH Guidance. SNH, Battleby

SNH 2009. *Monitoring the impact of onshore wind farms on birds.* SNH.

Scottish Government. 2013. *2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland.* Scottish Government, Edinburgh.

Scottish Government, 2022. *Scottish Biodiversity Strategy to 2045. Tackling the Nature Emergency in Scotland.* Scottish Government, Edinburgh.

Scottish Government, 2023. *National Planning Policy 4.* Scottish Government, Edinburgh.

Scottish Natural Heritage (SNH). 2000. *Guidance Note: Windfarms and Birds: Calculating a theoretical collision risk assuming no avoiding action.* SNH, Battleby.

SNH. 2002. *Natural Heritage Zones: A National Assessment of Scotland's Landscapes.* SNH.

SNH. 2010. *Survey Methods for Use in assessing the Impacts of Onshore Wind farms on Bird Communities. November 2005 (revised December 2010).* SNH, Battleby.

SNH. 2016. *Assessing Connectivity with Special Protection Areas (SPAs). Version 3 – June 2016.* SNH.

SNH. 2017. *Recommended bird survey methods to inform impact assessment of onshore wind farms. March 2017. Version 2*. SNH, Inverness.

SNH. 2018. *Guidance – Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas.* SNH.

Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency & Forestry Commission Scotland. 2019. *Good Practice during Wind Farm Construction, 4th edition.* Good Practice during wind farm construction - 4th Ed. Scottish Renewables.

Sim, I.M.W., Eaton, M.A., Setchfield, R.P., Warren, P.K. & Lindley, P. 2008. Abundance of male black grouse *Tetrao tetrix* in Britain in 2005, and change since 1995-96. *Bird Study* **55**, 304-313.

Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. & Win, I. 2021 The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds* **114**, 723-747.

Thaxter, C.B., Buchanan, G.M., Carr, J., Butchart, S.H.M., Newbold, T., Green, R.E., Tobias, J.A., Foden, W.B., O'Brien, S. & Pearch-Higgins, J. W. 2017. Bird and bat species' global vulnerability to collision mortality at wind farms revealed through trait-based assessment. *Proceedings of the Royal Society B.* **284**, 20170829.

Thelander, C.G., Smallwood, K.S. & Rugge, L. 2003. *Bird risk behaviours and fatalities at the Altamont Pass Wind Resource Area. Period of performance: March 1998 – December 2000*. National Renewable Energy Laboratory, Colorado.

Trinder, M., Rowcliffe, M., Pettifor, R., Rees, E., Griffin, L., Ogilview, M. & Percical, S. 2005. *Status and population viability analyses of geese in Scotland. Scottish Natural Heritage Commissioned Report No. 107 (ROAME No. F03AC302).* SNH, Inverness.

Walker, D., McGrady, M., McCluskie, A., Madders, M. & McLeod, D.R.A. 2005. Resident golden eagle ranging behaviour before and after construction of a wind farm in Argyll. *Scottish Birds* **25**, 24-40.

Whitfield, D.P. 2009. *Collision avoidance of golden eagles at wind farms under the 'Band' collision risk model. Report from Natural Research to Scottish Natural Heritage.* Natural Research Ltd., Banchory.

Wilson, M.W., Austin, G.E., Gillings S. & Wernham, C.V. 2015. *Natural Heritage Zone Bird Population Estimates. SWBSG Commissioned report number SWBSG_1504.* Scottish Windfarm Bird Steering Group (SWBSG), Edinburgh.

Zeiler, H.P. & Grünschachner-Berger, V. 2009. Impact of wind power plants on black grouse, *Lyrurus textrix* in Alpine regions. *Folia Zoologica* **58**, 173-182.