CONTENTS

INTRODUCTION

9.1 This Chapter provides a description and assessment of the existing avian activity of the location designated for the proposed Balmeanach Wind Farm (henceforth referred to as 'the site' and 'Proposed Development' respectively) and the surrounding area. It assesses the potential effects of the Proposed Development on key target bird species and, where necessary, describes proposed mitigation, compensation and enhancement measures. This Chapter considers avian species only. All scientific names for species mentioned in this chapter are listed in the **Technical Appendix 9.1: Ornithology Surveys 2020-2022.** Potential effects on habitats and non-avian animal species are considered separately in **Chapter 8: Ecology**. Chapters 8 and 9 together provide an assessment of the potential effects of the Proposed Development on biodiversity. Planning policies of relevance to this assessment are provided in **Chapter 4: Policy Context**.

9.2 This Chapter is supported by a number of Technical Appendices, as follows:

- **Technical Appendix 9.1: Ornithology Surveys 2020-2022**;
- **Technical Appendix 9.2: Confidential Ornithology Information**;
- **Technical Appendix 9.3: Avian Collision Risk Assessment**;
- **Technical Appendix 9.4: Confidential White-tailed Eagle Avoidance Rate Review**;
- **Technical Appendix 9.5: Confidential Report on GET Modelling**; and
- **Technical Appendix 9.6: Modelling the Impacts of Wind Farm Mortality on White-tailed Eagles.**

SCOPE AND CONSULTATION

Consultation and Scoping Responses

9.3 A Scoping Report (SLR, 2022) was submitted to The Highland Council (THC) in August 2022. Scoping responses containing comments relating to ornithology were obtained in October and December 2022 from the following organisations:

- THC;
- NatureScot; and
- Royal Society for the Protection of Birds (RSPB).

9.4 A summary of the key points from the relevant scoping responses and other consultations with the relevant organisations undertaken in 2021 and 2022 is provided in **Table 9-1**, along with details of how the comments have been addressed in this Chapter.

Table 9-1: Key Issues

Consultee (Date)	Summary of Key Issues	SLR's Comments
NatureScot (March 2021)	We have confirmed that due to the available information provided by survey work on adjacent sites, one full year of bird survey work is sufficient to give an informed view of bird use on the site. In this case there are no designated sites for birds with connectivity to the proposed wind farm. The only significant ornithological interests that might be impacted by this proposal are golden and white-tailed eagles in the wider countryside.	A first year of ornithology surveys was undertaken from February 2020 to March 2021, however, the importance of white-tailed eagle and golden eagle populations in this area was considered and additional surveys were undertaken from October 2021 to September 2022, focussing on white-tailed eagle and golden eagle activity.
THC (October 2022)	An assessment of the impacts to birds through collision, disturbance and displacement from foraging / breeding / roosting habitat will be required for both the Proposed Development site and cumulatively with other proposals. The EIAR should be clear on the survey methods and any deviations from guidance on ornithology matters.	Impacts are covered in "**Assessment of Effects**". Deviations from survey guidance are covered in "Assumptions, Limitations and Confidence" section in "**Approach and Methods**"
NatureScot (December 2022)	There appear to be gaps in the viewshed coverage around Turbine 1 and Turbine 2[1]. This may have resulted from recent changes to the layout that have pushed turbines further north than previously envisaged. It will be important to establish whether this is a real gap in coverage or an artefact of the viewshed process, and whether there are alternative data sets that cover this ground. The February 2021 SLR review of the ornithological data suggests that Turbine 1[1] may be within one of the Ben Sca Wind Farm viewsheds but Turbine 2 is outwith the visible area. Clearly turbines should not be proposed in areas where ornithological data is lacking.	To address this gap in coverage, the collision risk modelling was conducted separately for these two northern turbines using data from surveys undertaken for the adjacent consented Ben Sca Wind Farm from 2018 to 2019, the viewsheds of which cover the area in which proposed Turbines 1 and 2 would be located. The results are summarised in "**Baseline Conditions**".
	We anticipate that the cumulative impact assessment will be a key consideration on this site. We agree with the general approach outlined in the scoping report which should follow our most recent guidance. Cumulative assessment is an ongoing process and it may be necessary to adjust previously quoted figures (e.g. from earlier EIA reports) to take account of new information or changes in important parameters (such as avoidance rates). Where a cumulative impact of national or regional significance is possible, we are likely to require a population viability analysis to be undertaken which should utilise the latest population parameters.	The cumulative impacts are assessed following NatureScot guidance (SNH, 2018c) in "**Cumulative Effects Assessment**". As recommended by NatureScot, population viability analysis was undertaken for white-tailed eagle, both for the Proposed Development and cumulatively along other wind farm developments on Skye – the modelling was conducted for both local (Skye) and regional (NHZ 6)

[1] Turbine 1 location of Layout D (Scoping Layout) shown on Figure 2.3

Consultee (Date)	Summary of Key Issues	SLR's Comments
	Cumulative impacts should be assessed at the relevant biogeographical scale which will depend on the species affected. Where there is uncertainty about the appropriate scale, effects may be calculated at multiple scales (e.g. Skye, regional, national) but these should always include a Natural Heritage Zone (NHZ) assessment.	scale. The results are summarised in "**Assessment of Effects**" and full report is provided in **Technical Appendix 9.6: Modelling the Impacts of Wind Farm Mortality on White-tailed Eagles**.
	We also recommend early consideration of potential mitigation measures. For example, carrion tends to skew eagle flight activity and can significantly increase collision risk. Removal of carrion/fallen stock has been discussed on other sites but would only be effective if carried out regularly and in collaboration with land managers.	Removal of carrion is one of the recommended mitigation measures for the Proposed Development. Details are in "Mitigation, Compensation and Enhancement" section in "**Assessment of Effects**".
	A collaborative regional conservation strategy with input from the various wind farm developers has been suggested for golden eagles and white-tailed eagles. We would welcome consideration of innovative and collaborative approaches to maintaining the favourable conservation status of these species.	A collaborative research programme aimed at both species of eagle is recommended in "Mitigation, Compensation and Enhancement" section in "**Assessment of Effects**".
RSPB (October 2022)	<u>Birds of Conservation Concern</u> • Golden eagle: This is the only expansive moorland area in north Skye that is not held by territorial adult eagles, as far as RSPB Scotland are aware, although the Highland Raptor Study Group (HRSG) should be contacted for the most up to date breeding locations within 6km of the proposal. As such and due to the rich prey base, this area is of particular importance for immature golden eagles. • White-tailed eagle: this species has made increasing use of roost sites in central Skye and have set up numerous territories in the surrounding area, resulting in a high density of eagles in this area. While the roost sites are predominantly being used by immature birds, it is likely territorial adult birds from locations up to 15-20km distant, will attend these communal roost sites. • Hen harrier: Choisleadar Forest has formed an important breeding area for hen harriers for many years, and the adjacent hill ground provides foraging habitat. The Proposed Development has the potential to pose a disturbance threat to breeding hen harriers and displace them from preferred foraging areas.	A comprehensive two-year baseline survey programme was conducted to describe the baseline conditions of the Proposed Development, following NatureScot guidelines (SNH, 2017). Furthermore, data on sensitive raptor species were requested from the HRSG to further our understanding of breeding and wintering raptor species at the Proposed Development. The baseline conditions are described in "**Baseline Conditions**".

Consultee (Date)	Summary of Key Issues	SLR's Comments
	Survey methodology: • It is disappointing to note that field surveys have almost been completed prior to scoping. We are content with the scope of the bird surveys undertaken however it would be prudent to include raptor roost surveys and winter walkovers within the suite of bird surveys. • We would also recommend that the existing north access tracks are also covered by bird surveys so that likely increased usage during construction and can be adequately assessed. • We note that the area within the red line boundary between the Ben Aketil Wind Farm and the Allt a Choire is not covered by any bird surveys. This is a particularly sensitive area for hen harriers, and therefore, if any infrastructure or activity is planned for this area, bird (and habitat) surveys will need to be undertaken. • The Breeding Bird Surveys do not cover a 500m buffer around T1 and T2 which could lead to underestimated impacts. • We recommend that information is provided within the EIA report to demonstrate that the survey data are adequate, robust and accurate, including: o Full information on the VP work undertaken, including dates, times and weather conditions. o Maps showing VP locations that also denote viewsheds. o Maps showing wader and raptor breeding, foraging and roosting areas. o Worked example(s) of collision risk calculations. o Provision of raw data for independent verification of collision risk calculations. • We have recommended this for other similar developments with impacts on golden eagle, and it would also be useful in this case.	The VP survey locations and species buffers were designed based on the original site boundary proposed in 2020. The application site boundary and proposed turbine layout now extend further north, leaving gaps in coverage around proposed Turbines 1 and 2. Therefore, reference to survey data collected in this area from the adjacent consented Ben Sca Wind Farm, surveys for which were undertaken in 2018/ 2019, have been included, to provide additional context to the current Balmeanach data. These surveys (and those undertaken for the consented Ben Sca Wind Farm Extension, surveys for which were undertaken in 2021), also covered hen harriers in the area described. The baseline survey methods and results are described in **Technical Appendix 9.1.**
	Assessment of impacts • The EIA should consider all the components of the proposal including turbines, battery compounds, existing and proposed access roads and onsite tracks, borrow pits, drainage, grid connection, substation and temporary	• The impact assessment presented in this chapter was conducted in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological

Consultee (Date)	Summary of Key Issues	SLR's Comments
	construction buildings/storage compounds. It should also assess the impacts of all phases of the project including decommissioning of the operational site, site selection, design, construction, operation and maintenance. • Disturbance, displacement, loss of suitable habitat (breeding, roosting and foraging) and collision risk should be assessed for all scoped-in species, during construction, operation and decommissioning. This should not only include impacts from the wind turbines but also new tracks and infrastructure as well as any existing road widening or upgrades. • With regards to eagles, we would recommend producing a Golden Eagle Terrain (GET) model, but this should not take precedence over observational data, particularly of breeding birds as the GET model is used to predict landscape use by dispersing and non-breeding golden eagles. • If collisions are predicted, then population models may to be required and we recommend that these should be produced to provide Counterfactual of Population Size (CPS) outputs.	Impact Assessment in the UK (CIEEM, 2018) and relevant NatureScot guidance. Detailed assessment methodology is provided in "**Approach and Methods**". • GET model and population viability analysis for white-tailed eagle were conducted to aid the assessment of these species. SLR consulted Natural Research Projects (NRP) about the CPS output and the response from NRP was that although outputs that will allow RSPB to calculate CPS can be provided, they consider this to be an inappropriate metric for white-tailed eagle and onshore wind farms in general. Details are provided in **Technical Appendix 9.5: Confidential Report on GET Modelling** and **Technical Appendix 9.6**.
	<u>Approach to design and mitigation</u> • We are concerned that the proposed wind farm could displace both eagle species from much of the area, which could have detrimental impacts on breeding success. Survey and GET model results should be used to help ensure that the final design of the wind farm avoids the areas within the site that will most likely be used by golden eagles. Turbines on ridges and slopes and at higher altitudes where golden eagles will likely be foraging should be avoided. • White-tailed eagles are also susceptible to collision and there have been a number of mitigation methods trialled to reduce collision risk that might be suitable at this site. For example, painting a blade black or radar detection of birds to automatically switch off turbines. Such mitigation should be considered as part of the EIAR.	• Displacement impacts and collision risk were fully assessed for both golden and white-tailed eagles, based on the results of baseline surveys, GET and population viability models. The results are summarised in **"Assessment of Effects"** and full details are provide in respective Technical Appendices. • No significant effects on any of the species are predicted, therefore painting blade black or automated turbine curtailment systems are not considered as part of the mitigation measures for the Proposed Development.
	<u>Cumulative Impacts</u> • We are concerned about the number of operational, consented and in-planning wind farms and overhead powerlines in this area of central Skye, as it is a particularly important area for immature eagles of both species. The wider availability of non-territorial space for	The cumulative impacts of all relevant projects are assessed following NatureScot guidance (SNH, 2018c) in the "**Cumulative Effects Assessment**" section.

Consultee (Date)	Summary of Key Issues	SLR's Comments
	these birds is diminishing due to such developments and we understand that NatureScot has previously expressed similar concerns during the previous Ben Aketil planning process. • Cumulative impacts on golden eagle and white-tailed eagle and their populations should be assessed across NHZ6 (Western Seaboard). This should include the Edinbane and Ben Aketil operational and proposed repowering wind farm projects, the Ben Sca and Extension Wind Farms, the Glen Ullinish Wind Farm and Beinn Mheadhonach Wind Farm. • Therefore, the cumulative assessment should take account of all existing and proposed wind energy schemes that could impact on the NHZ6 bird populations in question. In addition, the cumulative effect of other relevant plans or projects such as overhead power lines and new woodland planting, forestry felling, and the Skye Reinforcement Project should also be considered.	

Effects Scoped Out

9.5 Matters to be scoped out of the EIA with respect to ornithology are as follows:

Impacts on Designated Sites

9.6 The distance between the Cuillins Special Protection Area (SPA), which is designated for golden eagle, and the Proposed Development's site boundary is 14.2km, which is beyond the typical maximum foraging range of the golden eagle, which is c. 9km (SNH 2016a). Although studies have shown significant differences in eagle ranging distances depending on season and breeding status (Haworth *et al.,* 2006), there is unlikely to be any connectivity or impacts on golden eagle from the Cuillins SPA. For this reason, impacts on the Cuillins SPA have not been considered further in this assessment.

Impacts on Species which do not represent Important Ornithological Features (IOFs) at the Site

9.7 In accordance with CIEEM guidelines detailed assessment is only required for IOFs. A list of IOFs, based on survey work completed, is included in **Table 9-7** (Evaluation of Ornithological Features).

APPROACH AND METHODS

9.8 The study area used for the ornithological impact assessment differs according to receptor as recommended by relevant good practice survey guidance, as defined by NatureScot guidelines (SNH, 2017). These are summarised in the Field Survey Methodology Section and are described in more detail within **Technical Appendix 9.1**.

Information and Data Sources

9.9 A desk study was undertaken to collate existing information on bird populations in and around the site, and to identify target species for baseline surveys.

9.10 This information, combined with baseline survey results, was utilised to put each target bird species recorded within the study area into context in terms of its national (Scotland), regional (NHZ 6) and local (Skye) importance.

9.11 In addition to the policy, legislation and guidance set out in **Technical Appendix 4.1** the following primary sources of contextual data were consulted:

- The Birds of Scotland (Forrester *et al.*, 2007);
- 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 (Stanbury *et al.*, 2021);
- Scottish Raptor Monitoring Scheme Reports (e.g. Challis *et al.*, 2022);
- Environmental Statement (ES) / EIA Report chapters from adjacent consented wind farm schemes of Ben Sca and Extension and post consent monitoring reports from adjacent operational wind farm schemes Ben Aketil and Edinbane;
- Review of published estimates of bird populations in Scotland (Wilson *et al.,* 2015); and
- Data for breeding eagles within at least 10km of the site boundary from the Highland Raptor Study Group (HRSG).

Designated Sites

9.12 A search was made for all sites with international, national or local authority designations for their ornithological interests. This included SPAs, Ramsar sites, and Sites of Special Scientific Interest (SSSIs) within a 10km radius of the site. The 10km range was based on the potential connectivity with golden eagle territories in designated sites (golden eagle has a maximum foraging range of 9km, SNH 2016a). The following sources were accessed to obtain information on designated sites:

- Joint Nature Conservation Committee (JNCC) website (http://www.jncc.gov.uk); and
- NatureScot Sitelink website (https://sitelink.nature.scot/home).

9.13 The site location and statutory designated sites are shown on **Figure 9.1.1.**

Field Survey Methodology

9.14 Baseline ornithology surveys were conducted from February 2020 to March 2021 and October 2021 to September 2022. Full details are presented in **Technical Appendix 9.1**.

Study Area

9.15 The study area is defined as the Proposed Development area at the time of baseline surveys taking place (which included the proposed turbine footprint and option area to the south west) plus any additional buffer area over which desk based or field assessments have been extended. Two study areas are relevant for this assessment: Balmeanach study area where the baseline surveys were conducted between February 2020 and September 2022 (shown on **Figure 9.1.2a**) and Ben Sca study area where baseline surveys for Ben Sca Wind Farm were conducted between January 2018 and March 2019 (as shown on **Figure 9.1.2b**). The survey buffers differ according to feature as recommended by relevant good practice survey guidance (SNH, 2017) and included the following distances:

- 500m (for breeding bird surveys);
- 1km (for diver surveys);
- 2km (for breeding raptor surveys); and
- 10km (for data request on breeding status of golden eagle and white-tailed eagle).

9.16 These are summarised in the Survey Methodology Section and are described in more detail within **Technical Appendix 9.1**.

9.17 For the assessment of impacts on bird species a variety of buffer distances have been applied to each turbine location and around all other infrastructure where appropriate. These buffers are in accordance with current guidance and evidence-based research.

Target and Secondary Species

9.18 Target species for ornithology surveys were defined by legal and/or conservation status and vulnerability to impacts caused by wind turbines. The list of target species is used to determine the presence of IOFs within the study area. As stated by NatureScot (SNH, 2017), target species may be drawn from the following lists:

- Annex I of the EC Birds Directive;
- Schedule 1 of the Wildlife & Countryside Act 1981; and
- Red-listed Birds of Conservation Concern (BoCC) (Stanbury *et al*., 2021).

9.19 For the Proposed Development the lists of primary and secondary target species are as follows:

Primary Target Species

- swans and geese – all species other than obvious feral birds;
- divers – all species;
- other wildfowl and waterbirds (excluding Canada goose and mallard);
- Annex I/ Schedule 1 raptors/owls; and

- waders (all species).

Secondary Target Species

- non-Annex I/ Schedule 1 raptors/ owls (e.g. kestrel, buzzard, sparrowhawk, tawny owl);
- raven;
- Canada goose and mallard, and
- notable non-passerines not stated above.

Baseline Survey Methodologies

9.20 Surveys undertaken from 2020 to 2022 were carried out in accordance with the relevant NatureScot guidance (SNH, 2017). After a review of the extensive ornithology data for the site and surrounding area undertaken by SLR, and following consultation with NatureScot in March 2021, it was agreed that one year of flight activity data was sufficient to inform the EIA. However, given the site's ornithological sensitivities, additional 12 months of surveys were undertaken to further investigate white-tailed eagle and golden eagle activity.

9.21 VP locations and viewsheds relevant to this assessment are shown on **Figures 9.1.2(a-b)**. Full survey details are provided in **Technical Appendix 9.1**.

Flight Activity Surveys

9.22 Surveys commenced in February 2020 from two VP locations and initially lasted 14 months till March 2021, totalling 115 and 111 hours at respective VPs (a minimum of thirty-six hours of flight activity surveys were conducted from each of the two VP locations during the breeding and non-breeding season).

9.23 In addition to this, surveys were conducted between October 2021 and September 2022 (12 months), totalling 72 hours from each VP.

9.24 Height bands were as follows:

- 1 = <30m
- 2 = 30-150m
- 3 = >150m

Breeding Wader Surveys

9.25 Surveys were undertaken in 2020 in accordance with NatureScot (2017) which includes recommendations set out in Calladine *et al.* (2009), which uses an adapted Brown and Shepherd (1993) methodology. Survey coverage was based on a 500m buffer from the Proposed Development area. Four visits were undertaken on a monthly basis during April to July.

Breeding Raptor Surveys

9.26 Species-specific surveys were undertaken for raptors in 2020 and 2022, following methods outlined within Hardey *et al.* (2009). Survey coverage was based on a 2km buffer from the Proposed Development area.

Lochan Surveys for Breeding Divers

9.27 Lochs with suitability for breeding divers within 1km of the Proposed Development area were surveyed in 2020, in order to confirm presence/absence of divers, and to determine the outcome of any breeding attempts. Survey methods followed those outlined in Gilbert *et al.* (1998) as per current NatureScot guidance. Three visits were made in April, May and July.

Collision Risk Modelling

9.28 As recommended by NatureScot guidance (SNH, 2000), the standard Band Collision Risk Model (CRM) (Band *et al*., 2007) was used to estimate collision risk based on recorded target species activity levels and flight behaviour, proposed turbine numbers and specifications, and the relevant species biometrics and flight characteristics.

9.29 Modelling collision risk under the Band CRM is a two-stage process. Stage 1 estimates the number of birds that fly through the rotor swept disc. Stage 2 predicts the proportion of these birds that have the potential to be hit by a rotor blade. Combining both stages produces an estimate of collision mortality in the absence of any avoidance action/behaviour by birds. Avoidance rates are then applied to generate predicted rates of collision mortality. Further details are provided in **Technical Appendix 9.3: Avian Collision Risk Assessment** and also in **Technical Appendix 9.4: Confidential White-tailed Eagle Avoidance Rate Review**.

Seasonal Definitions

9.30 Two runs of CRM were conducted using the Balmeanach dataset from 2020 to 2022 to calculate collision rates for areas encompassing proposed Turbines 1-10, and the Ben Sca dataset from 2018 to 2019 to calculate collision rates for areas encompassing proposed Turbines 1 and 2 only. The CRM using the Ben Sca dataset was conducted to address the gap in the VP viewshed coverage around proposed Turbines 1 and 2.

9.31 CRMs using Balmeanach dataset (February 2020 to March 2021 and October 2021 to September 2022) were constructed using data based on the following survey design and taking into account the relevant species breeding season periods: February – August 2020 (breeding season 2020), September 2020 – March 2021 (non-breeding season 2020/21); October 2021 – March 2022 (non-breeding season 2021/22) and April – September 2022 (breeding season 2022). CRMs using Ben Sca dataset (January 2018 to March 2019) were constructed using the following survey periods January – August 2018 (breeding season 2018) and September 2018 to March 2019 (non-breeding season 2018/19).

Flight Selection

9.32 In order to select flights liable to incur a potential risk of collision, i.e. within the areas occupied by proposed turbines, the CRM used only observations collected within the wind farm polygon (WP) –

defined by a 500m buffer around the proposed outermost turbine locations and occurring within the Potential Collision Height (PCH).

9.33 In the interest of proportionality, species rarely present, for which significant collision impacts due to the Proposed Development are highly unlikely, were excluded. Sufficient flight activity to qualify for CRM (minimum of three flights per season and/or minimum of 10 birds) was recorded for: white-tailed eagle, golden eagle, hen harrier and golden plover.

Assessment Methods

9.34 **Chapter 5: Environmental Impact Assessment** provides further detail on the general approach to assessment. It also sets out the list of projects to be considered in the cumulative assessment and their status. The specific methodology used for this assessment is set out below.

9.35 The CIEEM Guidelines for Ecological Impact Assessment in the UK (CIEEM, 2019) (henceforth referred to as the CIEEM guidelines) form the basis of the impact assessment presented in this Chapter. The CIEEM guidelines have been endorsed by NatureScot. Reference has also been made to relevant NatureScot guidance as appropriate (listed in Guidelines and Technical Standards Section).

Sensitivity of Features

9.36 In accordance with the CIEEM guidelines, only ornithological features which are considered to be important and potentially affected by the project should be subject to detailed assessment. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts and would remain viable and sustainable.

9.37 Ornithological features should be considered within a defined geographical context so for this project the following geographic frame of reference is used:

- international;
- national (i.e. Scotland);
- regional (i.e. NatureScot Natural Heritage Zone 6 (SNH, 2018a; Wilson, 2015));
- local (i.e. the site plus circa 10km); and
- less than local.

9.38 For designated sites, importance should reflect the geographical context of the designation. For example, a SSSI would normally be considered nationally important.

9.39 In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include:

- species of European conservation importance (as listed on Annex I of the Birds Directive); and
- species considered to be of principal importance for biodiversity in Scotland, as listed under Part 1 Section 2(4) of the Nature Conservation (Scotland) Act 2004.

9.40 Reference has also been made in particular to published bird population estimates such as Wilson *et al.* (2015) for NHZs within Scotland and Woodward *et al.* (2020) for Great Britain.

9.41 Where appropriate, the value of species populations has been determined using the standard '1% criterion' method (e.g. Holt *et al.*, 2012). Using this, the presence of >1% of the international population of a species is considered internationally important; >1% of the national population is considered nationally important; etc.

Assessing Impacts and the Significance of an Effect

9.42 Both direct and indirect impacts are considered. Direct impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a bird species during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or feature, e.g. the creation of roads which cause hydrological changes, which, in the absence of mitigation, could lead to the drying out of wetland habitats used by important bird species.

9.43 For the purposes of this ornithology assessment, in accordance with CIEEM guidelines, a 'significant effect' is an effect that either supports or undermines conservation objectives for 'important ornithological features'. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy). Effects can be considered significant at a wide range of scales from international to local. For example, a significant effect on a regionally important population of a species is likely to be of regional significance.

9.44 Consideration of conservation status is important for evaluating the effects of impacts on bird species and assessing their significance. Conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

Avoidance, Mitigation, Compensation and Enhancement

9.45 A sequential process has been adopted to avoid, mitigate and compensate for ornithological impacts. This is referred to as the 'mitigation hierarchy'.

9.46 The differences between avoidance, mitigation, compensation and enhancement are defined here as follows:

- avoidance is used where an impact such as disturbance or displacement of breeding raptors e.g. hen harrier has been avoided e.g. through changes in scheme design;
- mitigation is used to refer to measures to reduce or remedy a specific negative impact in situ i.e. direct habitat loss which may reduce a breeding or foraging range;
- compensation describes measures taken to offset residual effects, i.e. where mitigation in situ is not possible; and
- enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary. Such measures can be set out in species specific biodiversity action plans.

Potential Cumulative Effects

9.47 Cumulative effects result from effects arising from two or more developments. Effects may be:

- additive (i.e. the sum of effects of different developments);
- antagonistic (i.e. the sum of effects are less than in a multiple independent additive model); or
- synergistic (i.e. the cumulative effect is greater than the sum of the multiple individual effects).

9.48 NatureScot has produced guidance on assessing cumulative effects on birds due to onshore wind energy developments (SNH, 2018c). While antagonistic or synergistic models may occur in real-life settings, the approach adopted in the NatureScot guidance is based on a simpler additive model. The approach adopted here is based on the NatureScot guidance (SNH, 2018c).

9.49 Cumulative effects have been assessed for all species for which detailed assessment has been undertaken in this EIA Report for which potentially significant negative effects are likely. The potential for cumulative effects due to collision mortality has been assessed. The cumulative assessment is based on consideration of residual effects, i.e. assuming that proposed mitigation and compensation measures for other projects are implemented.

9.50 With regard to the spatial extent of the cumulative assessment, as set out in the scoping report, current NatureScot (2018c) guidance indicates that the default approach should be to assess cumulative effects at the Natural Heritage Zone (NHZ) scale, unless there is a reasonable alternative. The site is located within NHZ 6 (Western Seaboard). In this case, consideration would entail assessment of operational projects, projects under construction, consented projects which are not yet under construction, and projects for which planning applications have been submitted, all on Skye.

9.51 The significance of potential cumulative effects has been determined using the same method adopted in the assessment of effects for the Proposed Development considered on its own. Cumulative effects are therefore considered significant if they undermine conservation objectives for important ornithological features. Cumulative effects can be considered significant at a wide range of scales from international to local. For example, a significant cumulative effect on a regional population of a species is likely to be of regional significance.

Assumptions, Limitations and Confidence

9.52 The validity of ornithological survey data requires that they were obtained using accepted methodologies and that surveys were carried out in suitable conditions. The field survey methodologies outlined above and described in greater detail in **Technical Appendix 9.1** were all carried out using survey standards recommended by NatureScot and were carried out during suitable times of the year.

9.53 With regard to VP survey coverage, proposed Turbines 1 and 2 are outside of the Balmeanach VP's viewshed. This resulted from changes in the proposed turbine layout extents through design evolution (see **Chapter 2: Site Description and Design Evolution**), which shifted turbines further north than originally envisaged. To address this gap in coverage, the collision risk modelling was conducted separately for these two northern turbines using data from surveys undertaken for the adjacent consented Ben Sca Wind Farm from 2018 to 2019, the viewsheds of which cover the area in which

proposed Turbines 1 and 2 would be located. All other turbine locations are covered by the two Balmeanach viewsheds and it is considered that the vantage point data are representative of the site as a whole and are sufficient to inform a robust impact assessment of the Proposed Development.

9.54 To avoid possible complications during any subsequent collision risk modelling, VP watches were timed such that surveys were not undertaken simultaneously from any of the VPs (as their viewsheds overlapped).

9.55 The boundary parameters of the site have changed several times during the period in which baseline surveys were conducted (more details are provided in **Chapter 2**). This resulted in gaps in the breeding bird survey area around the two most northern proposed Turbines (1 and 2) (**Figure 9.1.2a**). Despite this, given the small percentage of the areas not surveyed, this is not considered a significant limitation, as given homogeneous character of the habitats on site, the results of the breeding bird surveys conducted within the study area are still representative for the whole site. It is also noted on **Figure 9.1.2b** that the Ben Sca breeding bird surveys covered this area.

9.56 The lifetime of the Proposed Development is expected to be 40 years, however the population viability analysis (PVA) for golden eagle was calculated with a 30-year projection. The accuracy of PVA decreases with increasing time, and projection lengths of 30+ years are considered unreliable due to environmental stochasticity. Thirty years was chosen as a reasonable compromise between providing accuracy against a reasonable timeframe.

9.57 On the basis of the above, there are considered to be no significant limitations in the data on which the assessment is based.

BASELINE CONDITIONS

Current Baseline

Designated Sites

9.58 There are no statutory sites designated for their bird interest within 10km of the site boundary. The closest site is the Cuillins SPA at approximately 14km to the south/ south east (**Figure 9.1.1**).

9.59 The Cuillins SPA is designated for regularly supporting a breeding population of European importance of the Annex I species, golden eagle. The SPA supports eight pairs, representing approximately 1.9% of the GB population. At designation in 1992 this site held 11 pairs of golden eagles representing at least 2.8% of the breeding population in Great Britain at that time.

Field Surveys

Flight Activity Surveys

9.60 Full details of the flight activity surveys undertaken from 2020 to 2022 (including Figures showing flight lines) are provided in **Technical Appendix 9.1**. Flight lines of target species are shown on **Figures 9.1.3-9.1.10**.

9.61 Flight activity was recorded by 10 target species (greylag goose, red-throated diver, white-tailed eagle, hen harrier, golden eagle, merlin, golden plover, common snipe, whimbrel and greenshank). Flight

activity for the first year of surveys (February 2020-March 2021) is summarised in **Table 9-2** and flight activity for the second year of surveys (October 2021-September 2022) is summarised in **Table 9-3**.

Table 9-2: Number of Primary Target Species Flights/ Individuals, February 2020-March 2021

Species	Number of flights per month (number of individuals)													
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Red-throated diver	0	0	0	0	4 (6)	0	0	0	0	0	0	0	0	0
White-tailed eagle	1 (1)	7 (9)	7 (8)	1 (1)	8 (8)	9 (11)	1 (1)	7 (7)	0	0	2 (2)	2 (2)	0	0
Hen harrier	0	0	1 (1)	0	0	0	1 (1)	0	1 (1)	0	0	0	0	0
Golden eagle	2 (3)	3 (4)	2 (3)	2 (2)	2 (2)	6 (7)	0	0	1 (1)	0	4 (4)	0	0	0
Merlin	0	0	1 (1)	0	0	0	0	1 (1)	0	0	0	0	0	0
Golden plover	0	2 (49)	1 (5)	0	1 (1)	1 (1)	1 (8)	0	2 (8)	0	0	0	0	3 (12)

Table 9-3: Number of Primary Target Species Flights/ Individuals, October 2021-September 2022

Species	Number of flights per month (number of individuals)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Greylag goose	0	0	0	0	0	1 (26)	0	0	0	0	0	0
White-tailed eagle	4 (4)	0	0	0	2 (2)	0	2 (2)	1 (1)	0	3 (3)	0	0
Hen harrier	0	0	0	0	0	0	0	0	0	5 (5)	0	3 (3)
Golden eagle	2 (2)	1 (1)	0	0	2 (2)	3 (3)	1 (1)	2 (3)	0	3 (3)	3 (3)	2 (2)
Golden plover	0	1 (4)	0	1 (26)	1 (39)	1 (5)	0	0	2 (2)	0	1 (1)	0
Snipe	0	0	0	0	0	0	0	2 (2)	0	0	0	0
Whimbrel	0	0	0	0	0	0	0	0	0	1 (1)	0	0
Greenshank	0	0	0	0	0	0	0	1 (1)	0	0	0	0

9.62 A seasonal summary of 'at risk' flight activity for the primary target species within the Collision Risk Zone (CRZ), defined as the area encompassed by the WP is provided in **Table 9-4**. The WP is also referred to as the CRZ which includes the area within 500m of the outermost turbine blade and at PCH within the rotor-swept area.

Table 9-4: Number of primary target species flights and individuals observed passing through the Balmeanach WP during VP surveys (2020 to 2022)

Species name	Period of analysis	Total number of birds recorded in flight	Flights through WP		Flights through WP at Potential Collision Height (PCH)	
			Flights	Individuals	Flights	Individuals
White-tailed eagle	Feb-20 to Aug-20	39	20	22	18	20
	Sep-20 to Mar-21	11	9	9	9	9
	Oct-21 to Mar-22	6	5	5	5	5
	Apr-22 to Sep-22	6	4	4	4	4
Golden eagle	Feb-20 to Aug-20	21	5	6	5	6

Species name	Period of analysis	Total number of birds recorded in flight	Flights through WP		Flights through WP at Potential Collision Height (PCH)	
			Flights	Individuals	Flights	Individuals
	Sep-20 to Mar-21	5	4	4	4	4
	Oct-21 to Mar-22	8	6	6	6	6
	Apr-22 to Sep-22	12	8	9	4	4
Hen harrier	Feb-20 to Aug-20	2	2	2	2	2
	Sep-20 to Mar-21	1	1	1	1	1
	Apr-22 to Sep-22	8	5	5	5	5
Golden plover	Feb-20 to Aug-20	64	6	64	6	64
	Sep-20 to Mar-21	20	5	20	5	20
	Oct-21 to Mar-22	74	4	74	4	74
	Apr-22 to Sep-22	3	3	3	3	3

9.63 A seasonal summary of 'at risk' flight activity for the primary target species passing through the CRZ comprising of Turbine 1 and Turbine 2 only (based on the Ben Sca flight activity data 2018-2019) is presented in Section 4.2 of **Technical Appendix 9.3**.

9.64 Seven secondary species were recorded on site during the flight activity surveys from 2020 to 2022 (red grouse, buzzard, kestrel, common gull, lesser black-backed gull, raven and snow bunting).

Breeding Wader Surveys

9.65 Golden plover was the only wader species recorded during the breeding bird surveys between April and July 2020. Records were located south of the summit of Ben Sca, with a maximum of two territories.

9.66 In addition to golden plover there were records of snipe, whimbrel and greenshank during the VP surveys. These were considered to be birds commuting through the site and were not likely to be breeding.

Breeding Raptor Surveys

9.67 Territory-holding white-tailed eagles and hen harriers were present within the survey buffer in 2020 and 2022. Further details, along with relevant details of consultations with the HRSG, are presented in **Technical Appendix 9.2** (Confidential).

9.68 The status of target raptor species within 2km and within 2-10km is summarised in **Table 9-5**.

Table 9-5: Breeding Status of Raptor Species (based on the 2020 and 2022 baseline surveys, the 2018/19 and 2021 surveys for the consented Ben Sca and Ben Sca Extension, and the HRSG data from 2017-22)

Species	Breeding Status within 2km	Breeding Status within 2-10km
White-tailed eagle	One territory plus active roost. Flights recorded over the site	Up to three territories within 10km with further three territories straddling the 10km buffer
Golden eagle	Not breeding within 2km. Flights recorded over the site	Three territories within 10km (last monitored in 2019)
Hen harrier	No breeding within 2km	Breeding outwith 2km at multiple locations (in 2018 – three nests to the north, in 2020 – one nest to the south, in 2021 – one territory to the north west, in 2022 – one nest to the south)
Merlin	Present in 2020, not breeding - on passage only (April and September)	n/a

Lochan Surveys for Breeding Divers

9.69 A pair of red-throated divers were present on one occasion in April 2020 within 2km of the site but these either did not breed or failed early in the season. Further details are presented in **Technical Appendix 9.2** (Confidential).

Collision Risk Modelling

9.70 CRM was conducted for four target species: white-tailed eagle, golden eagle, hen harrier and golden plover using the Balmeanach dataset 2020-2022 (proposed Turbines 1-10) and the Ben Sca dataset 2018-2019 (proposed Turbines 1 and 2). **Table 9-6** shows the predicted collisions risk expressed as sum of two annual rates (for the Balmeanach dataset) and a single annual rate (for the Ben Sca dataset). The CRM outputs for Turbines 1 and 2 alone are lower (except for hen harrier), indicating a lower level of flight activity for white-tailed eagle, golden eagle and golden plover in this area, albeit from different years. The final outputs used for the assessment is shown in bold.

Table 9-6: Breeding Status of Raptor Species (based on the 2020 and 2022 baseline surveys

Species name	Dataset/ Turbine area	Annual modelled collisions	Years per collision
White-tailed eagle	Balmeanach 2020-2022/ Turbines 1-10	**1.3796**	**0.72**
	Ben Sca 2018-2019/ Turbines 1-2	0.1907	5.24
Golden eagle	Balmeanach 2020-2022/ Turbines 1-10	**0.1550**	**6.45**
	Ben Sca 2018-2019/ Turbines 1-2	0.0700	14.28
Hen harrier	Balmeanach 2020-2022/ Turbines 1-10	**0.0352**	**28.37**
	Ben Sca 2018-2019/ Turbines 1-2	0.0542	18.45

Species name	Dataset/ Turbine area	Annual modelled collisions	Years per collision
Golden plover	Balmeanach 2020-2022/ Turbines 1-10	1.7474	0.57
	Ben Sca 2018-2019/ Turbines 1-2	0.2781	3.60

Evaluation of Ornithological Features

9.71 Applying the criteria outlined in the '**Sensitivity of Features**' section (**paragraphs 9.36 to 9.41**), an evaluation of the importance of the relevant study areas for each primary target species recorded during the baseline surveys is provided in **Table 9-7** (overleaf). The target species with a value of 'local' and above are the ones taken forward as IOFs for detailed assessment. Details on the status of other primary and the secondary target species at the site are provided in **Technical Appendix 9.1**.

Table 9-7: Evaluation of IOF Populations within the Study Area

Value	IOFs	Species Information, Status & Baseline	Justification
Regional	White-tailed eagle	• Annex I; • Schedule 1 (including 1A & A1); • SBL priority species; • UK BoCC Amber List; • The Scottish breeding population was estimated as 82 breeding pairs in 2013 (Wilson *et al.,* 2015) and 122 pairs in 2017 (Eaton, 2021); • NHZ 6, Western Seaboard (includes Skye, Mull, Rum, Western Lochaber): 23 territorial pairs in 2013 (Wilson *et al.*, 2015); • 22 home ranges occupied on Skye in 2020 (Challis *et al.,* 2022); • Baseline surveys – there were 45 flights recorded in Year 1 (36 during the breeding season) and 12 flights recorded in Year 2. Commuting flights predominated (n=15 flights) but foraging was also recorded (n=12 flights). Other flight behaviours included display (n=6 flights) and to-and-from roost flights (n=4 flights). • 36 flights were used for CRM which produced an annual collision estimate of 1.3796 birds per year; and • One territory (a new nest) and active roost were present within 2km. Up to three territories are found within 10km with further three territories straddling the 10km buffer.	This species is not a qualifying feature of any statutory sites within 10km of the site but is afforded special protection (Schedule 1) and is of high conservation concern (Annex I, SBL and Amber-listed species). Two territorial adults represent 0.82% of the 2017 Scottish population. With one breeding pair confirmed within 2km, the study area is considered to be no more than regionally important for white-tailed eagle.
Local	Golden eagle	• Annex I; • Schedule 1 (including 1A & A1); • SBL priority species; • UK BoCC Green List; • The Scottish population was estimated as 508 pairs (of which 434 were adult pairs) in 2015 (Hayhow *et al.,* 2017);	This species is not a qualifying feature of any statutory sites within 10km of the site but is afforded special protection (Schedule 1) and is of conservation importance (Annex I and SBL species). One adult represents 0.1% of the Scottish breeding population; 0.4% of the Hebridean Isles population; 0.7% of the NHZ 6 population and 1.6% of the population of the Isle of Skye. With no breeding

Value	IOFs	Species Information, Status & Baseline	Justification
		• The 2015 survey estimated the population in the Hebridean Isles was 132 pairs (out of 161 home ranges). NHZ 6 (Western Seaboard): 74 territorial pairs in 2003 (Wilson *et al.*, 2015); • 30 home ranges occupied on Skye in 2016 but far fewer pairs have been recorded from 2016 onwards, partly due to drop in the monitoring effort, and partly due to genuine local population decline (Challis *et al.,* 2018, 2022); • Baseline surveys – there were 22 flights recorded in Year 1 and 19 flights recorded in year 2. More flight activity occurred during the breeding seasons; foraging flights (n=15 flights) and commuting flights (n=11) predominated and were equally distributed over the site; • 19 flights were used for CRM which produced an annual collision estimate of 0.1550 birds per year; and • Golden eagle was not found breeding within 2km, however, as of 2019, there were up to three breeding ranges within 10km (two active and the third in a state of flux).	confirmed within 2km of the site, the study area is therefore considered to be no more than locally important for golden eagle.
Regional	Hen harrier	• Annex I; • Schedule 1 (including 1A); • SBL priority species; • UK BoCC Red List; • The Scottish population was estimated as 460 (359-573) breeding pairs in the latest national survey in 2016 (Wotton *et al.*, 2018); in 2020, the Scottish Raptor Monitoring Scheme reported 153 home ranges occupied by pairs (Challis *et al.,* 2022); • West Highlands: 175 (100-256) territorial pairs in 2016 (Wotton *et al.*, 2018);	This species is not a qualifying feature of any statutory sites within 10km of the site but is afforded special protection (Schedule 1) and is of high conservation concern (Annex I, SBL and Red-listed species). Although it was recorded sporadically during baseline surveys, given it is a regularly breeding species around the site, it can be considered of importance in a regional context.

Value	IOFs	Species Information, Status & Baseline	Justification
		• The most recent estimate of the number of breeding pairs of hen harrier in the relevant NHZ is 38 pairs in (Western Seaboard (NHZ 6)) (Wilson *et al.*, 2015); • Baseline surveys – there were three flights recorded in Year 1 and eight flights recorded in Year 2 to the south of the site. Nine of those flights were foraging birds. • Eight flights were used for CRM which produced an annual collision estimate of 0.0352 birds per year; and • Baseline breeding bird surveys did not identify any breeding hen harrier territories within the 2km of the site, however, this species breeds in the wider environs around the site (in 2018 – there were three nests to the north, in 2020 – one nest to the south, in 2021 – one territory to the north west, in 2022 – one nest to the south). These nesting locations are within 2-4km distance from the proposed turbines (also, one nest was recorded 350m from the access track).	
Local	Golden plover	• Annex I; • SBL priority species; • UK BoCC Green List; • The Scottish breeding population is estimated as 15,000 breeding pairs (Forrester *et al.*, 2007) or 37,480 breeding pairs (Wilson *et al.*, 2015); • The Scottish wintering population was estimated by Forrester *et al.,* 2007 as 25,000-35,000; • The most recent estimate of the number of golden plover breeding pairs in NHZ 6 is c. 1,606 pairs (Wilson *et al.*, 2015); • Baseline surveys – there were 11 flights recorded in Year 1 and seven flights recorded in Year 2, all totaling 161 individuals; • All these flights were used for CRM which produced an annual collision estimate of 1.7474 birds per year; and	This species is of local value as a target species of conservation importance (Annex I and SBL species) that is present in locally important numbers but is not a qualifying feature of any statutory sites within 10km of the site.

Value	IOFs	Species Information, Status & Baseline	Justification
		• Baseline breeding bird surveys identified up to two territorial pairs of golden plover within the study area in 2020 (with one territory in approximate distance of 150m from the nearest proposed turbine).	
Negligible	All other species	• See **Technical Appendix 9.1** for baseline survey results.	All other species are either relatively common or widespread and/or were recorded only infrequently/in small numbers and are therefore not considered important.

Future Baseline

9.72 In the absence of the Proposed Development, and assuming the continuation of the current land use in the area (grazing and game shooting), no major changes are expected to the character of the upland landscape, which comprises mostly of blanket bog and heath habitats. No change in these habitats is anticipated in the short to medium term and consequently the bird community is likely to continue to be present in similar abundances and distributions.

9.73 There is the potential that the populations of ground nesting birds (e.g. golden plover) may increase in the future following habitat recovery after the fire 2018 which impacted the habitats within the study area of the Proposed Development (the 2018 fire event is described in more detail in **Chapter 2**). There may therefore be some increase in the activity of golden plover and other ground nesting species; otherwise, there is unlikely to be an increase in raptor activity from the level recorded during the baseline surveys.

9.74 It is more difficult to predict changes that may occur in the long-term, especially in the wake of climate change, which is thought to cause range shifts in some bird species (Huntley *et al.*, 2007). Climate change may alter habitat types by impacting the composition and health of the plant communities present, thereby affecting the habitat suitability for some of the bird species which currently occupy the site. Baseline surveys carried out for the Proposed Development represent a snapshot of the bird community at the time and cannot be extrapolated to predict future population trends in the event of climate change.

ASSESSMENT OF EFFECTS

Effects Assessed in Full

9.75 This assessment concentrates on the effects of construction, operation and decommissioning of the Proposed Development upon important ornithological features. The following potential effects have been assessed:

- habitat loss or damage (permanent and temporary) due to construction of wind farm infrastructure;
- inadvertent destruction of nests during construction;
- disturbance to birds during construction due to vehicular traffic, operating plant and the presence of construction workers;
- disturbance to birds due to the operation of the wind turbines, vehicular traffic and the presence of people during operation;
- barrier effect due to the operation of the wind turbines; and
- mortality of birds caused by collisions with turbine blades and other infrastructure.

9.76 Effects have been assessed in detail for the following ornithological features (see **Table 9-7** for justification):

- white-tailed eagle;
- golden eagle;
- hen harrier; and
- golden plover.

9.77 This list includes all species which are potentially vulnerable to significant effects from the Proposed Development, which are also:

- species for which the study area is considered to be important at a local level or above;
- species listed on Annex I of the Birds Directive; and/or
- breeding species listed on Schedule 1 of The Wildlife and Countryside Act 1981 (as amended in Scotland).

Embedded Mitigation and Good Practice Measures

9.78 The assessment of effects is based on the information outlined in **Chapter 3: Description of the Development**. The Proposed Development has undergone a number of design iterations and evolution in response to the constraints identified as part of the baseline studies and field studies. With respect to ornithology, no constraints have been identified during the design phase that would necessitate any changes to the Proposed Development.

9.79 Full details of construction mitigation measures would be provided in a Construction Environmental Management Plan (CEMP). An outline CEMP is included as **Technical Appendix 3.1**.

9.80 Good practice measures, as outlined below, would be employed to reduce the possibility of damage and destruction (and disturbance in the case of sensitive species such as breeding raptors and waders), to occupied bird nests during the construction phase. Good practice measures would be secured through the CEMP.

Timing of Works, Pre-Commencement Surveys and Implementation of Disturbance-Free Buffer Zones

9.81 Under the Wildlife and Countryside Act 1981, it is an offence, with only limited exceptions, to:

- intentionally or recklessly take, interfere with, damage or destroy the nest of any wild bird whilst it is in use or being built (applies year round for nests of birds included in Schedule A1);
- obstruct or prevent any wild bird from using its nest;
- intentionally or recklessly take, interfere with or destroy the egg of any wild bird;
- intentionally or recklessly disturb any wild bird listed in Schedule 1 while it is nest building, or at (or near) a nest containing eggs or young, or disturb the dependent young of such a bird;
- intentionally or recklessly harass any wild bird included in Schedule 1A; or

- knowingly cause or permit any of the above acts.

9.82 Avoidance of damage to, or destruction of nests, or disturbance to sensitive species whilst nesting can be achieved through careful timing of construction activities; for example restricting activities in sensitive areas as far as practicable in the early part of the breeding season until the location and breeding status of nesting birds has been established. If site clearance and construction activities are required to take place during the main breeding bird season, from mid-March to August inclusive, pre-commencement survey work would be undertaken to ensure that nest destruction and disturbance to sensitive species (i.e. breeding raptors and waders) are avoided. Where applicable, construction would not take place within specified disturbance-free buffer zones for certain sensitive species during the breeding season.

9.83 Disturbance-free buffer zones around nest sites of sensitive species would be applied and monitored closely. For breeding waders, disturbance-free buffer zones are only required until chicks have hatched and are capable of walking away from any sources of disturbance.

9.84 Based on 2020 and 2022 survey data and the relevant literature (e.g. Goodship and Furness 2022), the following disturbance-free buffer zones are considered likely to be required to help prevent nest failure due to disturbance during construction. It should be noted that these distances represent a guide only and these may vary according to topography and other factors at each nest site.

- white-tailed eagle – 250-500m;
- golden eagle – 750-1000m;
- hen harrier – 300-750m; and
- golden plover – 200-500m.

Environmental Clerk of Works

9.85 A suitably qualified Environmental Clerk of Works (EnvCoW) would be employed to oversee activity at key points for the duration of the construction and reinstatement periods (at a frequency to be agreed with THC and NatureScot), to ensure natural heritage interests are safeguarded. The role of the EnvCoW would include the following specific roles with regard to the ornithology interest of the site:

- prior to the start of construction and/or the breeding bird season, the EnvCoW would make contractors aware of the ornithological sensitivities within the site (particularly with regard to the potential presence of sensitive breeding species, i.e. breeding waders and raptors); and
- the EnvCoW would undertake surveys for nesting birds throughout the construction period that falls within the nesting season and set up and monitor appropriate exclusion areas whilst nests of relevant species are in use.

Construction Effects

9.86 Potential effects, assuming that the good practice mitigation measures outlined in **paragraphs 9.81 to 9.84** are implemented, are addressed for each important receptor in turn.

Nest Damage or Destruction

9.87 Damage or destruction to active nests could contravene the Wildlife and Countryside Act 1981 (as amended in Scotland). However, the good practice measures would avoid the likelihood of damage, destruction or disturbance to occupied bird nests during the construction phase. As such, no significant effects are predicted for any species due to nest damage or destruction.

Habitat Loss

9.88 Construction of turbine bases, access tracks and other structures would lead to habitat loss (see **Chapter 8: Ecology, Table 8-8**). The direct and indirect loss of blanket bog, wet and dry heath, and marshy and acid grassland habitats of potential value to important ornithological features amounts to 34.37ha. This habitat loss is only likely to affect important species breeding within the study area, which are likely to use these habitats for nesting and foraging (i.e. golden plover). Whilst white-tailed eagle, golden eagle and hen harrier may suffer some loss of available habitat for foraging, effects are not likely to be significant given the large size of their foraging ranges, their occasional use of the site and the wide availability of alternative breeding and foraging habitat. Therefore, white-tailed eagle, golden eagle and hen harrier are not considered further in respect of habitat loss.

Golden Plover

9.89 The effects of direct habitat loss on golden plover due to wind farms are generally considered to be not significant compared to the species' overall territory size (core range of 3km (SNH, 2016a)). Out of two confirmed golden plover territories found in 2020, one was within the WP (see **Technical Appendix 9.1** for details). However, with abundant habitat available for nesting and foraging, it is considered that there would be no significant effect on the conservation status of golden plover in terms of habitat loss caused by the Proposed Development.

Disturbance/Displacement

9.90 During the construction stage of the Proposed Development, the potential effects of associated noise and visual disturbance could lead to the temporary displacement or disruption of breeding and foraging birds. The level of impact would depend on the timing of potentially disturbing activities, the extent of displacement (both spatially and temporally) and the availability of suitable habitats in the surrounding area for displaced birds to occupy.

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

9.92 Disturbance of birds due to construction activities of this type have not been sufficiently quantified in the literature and the available information is often contradictory. However, it is likely that construction impacts would be greater on species that are intolerant of noise and other sources of

disturbance. Larger bird species, those higher up the food chain or those that feed in flocks in the open tend to be more vulnerable to disturbance than small birds living in structurally complex or closed habitats such as woodland (Hill *et al.*, 1997).

9.93 The potential effects associated with construction activities are only likely to occur for as long as the construction phase continues and are thus generally short-term in nature. The exception to this would be if a negative effect on the breeding success of a feature were such that the local population becomes extinct and replacement through recruitment or re-colonisation does not occur. For example, a study by Pearce-Higgins *et al.* (2012) found that snipe and curlew densities declined significantly on wind farms during construction and had not recovered by the first year post-construction.

9.94 Disturbance/displacement effects during construction are only likely to affect species breeding within the relevant parts of the study area (i.e. golden plover only).

9.95 Construction disturbance can be readily mitigated by avoiding sensitive areas through the implementation of appropriately defined buffer zones and by timing construction activities to avoid periods where sensitive species are present (if and where possible), such as the breeding season. A range of good practice measures have therefore been proposed to mitigate for potential construction disturbance effects (**paragraphs 9.83 to 9.8580**).

White-tailed Eagle

9.96 One breeding white-tailed eagle territory is present within 2km of the Proposed Development. However, the distance from the nest is beyond the upper limit of the active disturbance distance of 500m from the site, cited by expert opinion in Goodship and Furness (2022), disturbance/displacement of white-tailed eagles during construction would be non-existent and therefore not significant.

Golden Eagle

9.97 No breeding golden eagles are present within 2km of the Proposed Development. The nearest occupied territories are located between 6km and 10km from the Proposed Development. Therefore, no disturbance to breeding sites is expected.

9.98 As there are no golden eagle breeding sites within the upper limit of the active disturbance distance of 1000m from the site cited by expert opinion in Goodship and Furness (2022), disturbance/displacement of golden eagles during construction would be non-existent and therefore not significant.

Hen Harrier

9.99 During wind farm construction, displacement has been suggested potentially to occur up to 500m around nest sites with some disruption up to 1km, depending on line of visibility (Madders 2004 cited in Bright *et al.,* 2006). Goodship and Furness (2022) suggested a maximum disturbance buffer of 300-750m for hen harrier, although the median static disturbance distance was around 300m. According to Ruddock and Whitfield (2007), signs of active disturbance were evident at much greater distances during chick-rearing than during incubation, with median disturbance distances of 225m and 30m respectively. From 2020 to 2022, there were no hen harrier nesting within the

2km of the proposed turbines, however, one territory was recorded in 2021 that was 350m from the access track (to the north west of the site).

9.100 In the event of hen harrier nests occurring within 750m of construction activities, the implementation of good practice measures would serve to minimise the risk of short-term population losses, by avoiding construction activity around any active nest sites (by up to 750m depending on topography). Some disturbance to foraging birds is possible but the area affected is likely to be very small in the context of a pair's foraging range.

9.101 Following the implementation of the proposed good practice measures, disturbance/displacement of hen harriers during construction would be negligible and not significant.

Golden Plover

9.102 Bright *et al.* (2006) reported that distances at which golden plover react to human disturbance range from 50m to 400m, but around 200m seems to be the normal limit of any effects (e.g. Finney *et al.,* 2005, Hötker *et al.,* 2006). One golden plover territory occurs within the disturbance distance of the proposed turbine location and there is therefore the potential for construction disturbance (**Figure 9.1.11**), depending on the location of birds at the time.

9.103 The employment of good practice measures would serve to minimise disturbance, by avoiding construction activity around nest sites by up to 200m depending on topography. On this basis, while some disturbance to birds away from the nest is possible, effects are not likely to be significant.

Operational Effects

Disturbance/Displacement

9.104 The operation of wind turbines and associated human activities for maintenance purposes also has the potential to cause disturbance and displace birds from the site. Disturbance effects during the operational phase may be less than during the construction phase, as species may become habituated to wind turbines and disturbance due to human activities would be considerably reduced.

9.105 Studies have shown that, in general, species are not disturbed beyond 500m to 800m from wind turbines (e.g. Drewitt and Langston, 2006 and references therein; Hötker *et al.*, 2006; Pearce-Higgins *et al.*, 2009) and, in some cases, birds do not appear to have been disturbed at all (e.g. Devereux *et al.*, 2008; Whitfield *et al.*, 2010; Douglas *et al.*, 2011; Fielding and Haworth, 2013).

9.106 There is less consensus of opinion about disturbance effects closer to wind farm infrastructure. Pearce-Higgins *et al.*, (2009) found evidence of lower frequencies of occurrence of some species within the vicinity of wind turbines during the breeding season, with a significant reduction in frequency of occurrence, compared to control sites, in seven of the 12 species studied. Other studies of curlew (Whitfield *et al.*, 2010), involving long-term monitoring found no evidence of displacement due to wind farm infrastructure.

White-tailed Eagle

9.107 Post consent monitoring at Edinbane Wind Farm (2007-2014) (Haworth Conservation 2015) concluded that the mean level of white-tailed eagle activity has generally been similar or greater at Edinbane and Ben Aketil Wind Farms compared with the surrounding habitat. This was *"particularly obvious in the southern part of the Edinbane wind farm where there was an enormous increase in the activity"* (paragraph 42, page 19). There was very little evidence for any displacement of white-tailed eagle flight activity by either wind farm. Ben Aketil post-consent monitoring (Atmos 2018) concluded that there is no evidence of avoidance of the wind farm evident in the data and that there was a preference for the higher altitude areas.

9.108 Based on the available evidence, it is likely that any disturbance/displacement impacts on white-tailed eagles during the operation of the Proposed Development will be negligible and not significant.

Golden Eagle

9.109 Some loss of foraging habitat may occur if golden eagles are displaced from the turbine area. Based on observational data from other wind farms, it can be assumed that the area of the Proposed Development (infrastructure and access track) and a 500m buffer would be lost as potential golden eagle range use (Walker *et al.,* 2005, Haworth 2010.).

9.110 Post consent monitoring at Ben Aketil in 2017 (Atmos 2018) gave a clear indication that golden eagles are displaced from the area around the turbines with a concentration of flights south and south west of the wind farm. At Edinbane flight activity declined during construction (2008-2010), particularly in 2009 and 2010. Since then, there has been some recovery with little difference between the 2007 and 2014 golden eagle data (Haworth Conservation 2015).

9.111 Incidences of foraging behaviour were recorded during flight activity surveys at the Proposed Development. Out of 40 flights for which behaviour was recorded, 15 (37.5%) included foraging, and eight of these were inside a 500m buffer of the turbines. The remainder of the foraging behaviour occurred along the ridge line to the east. It is possible that golden eagles will be discouraged from using the operational wind farm for foraging, however, this impact would only occur at the local level.

9.112 To further investigate potential displacement effects, the Golden Eagle Topography (GET) model was used to predict the habitat use by golden eagles within the Proposed Development (**Technical Appendix 9.5** (Confidential). The model is designed to help predict the extent of habitat loss based on topographic data only. The GET model assigns a score between 1 and 10 for every 50m pixel across Scotland. Habitat with a GET score of 6+ is a good indicator of potential golden eagle activity; habitat with a score of 5 or less is used infrequently. Areas of forestry and waterbodies are excluded from the calculations as it has been found that they are functionally not used by foraging golden eagles.

9.113 The GET model was run for the potential development area (PDA) which includes proposed turbines and a 300m buffer (approximately 275 hectares (ha)). Within the PDA the model predicted that there are 229ha of less preferred eagle habitat (GET score 3-5), which accounts for 88.8% of the PDA, and 15ha of preferred (GET score 6+) habitat, which accounts for 5.8% of the PDA. The average GET score within the PDA is 4.07. These results show that the site does not offer good suitability for golden eagles to forage, and potential loss of 5.8% of the PDA will be insubstantial as

the PDA itself does not constitute a breeding territory of golden eagle. As such, any habitat loss and displacement impact on golden eagle will be negligible.

9.114 Based on the available evidence, it is likely that any disturbance/displacement impacts on golden eagles during the operation of the wind farm will be local in nature, not affecting a breeding territory and therefore is not significant.

Hen Harrier

9.115 Post consent monitoring at Ben Aketil (Atmos 2018) found that the number of active hen harrier territories in the vicinity of the wind farm has remained stable since 2013. The population is however less than half what it was in 2010-11. There is no obvious link between the decline and the Ben Aketil development (McMillan, 2017). It is apparent that hen harrier breeding productivity varies markedly between years, with a high degree of nest failure in some seasons. Breeding hen harriers tend to show relatively high site fidelity, and it is more likely that inter-year variation in breeding success is the result of the availability of prey (field voles), which fluctuate on a four-year cycle and can create favourable conditions for hen harrier to breed, rather than the effect of operational wind farms.

9.116 There are examples of hen harriers successfully nesting within 200m of the operational turbines (for example at Ben Aketil Wind Farm and Paul's Hill Wind Farm). Other displacement studies have also concluded that foraging hen harriers have a low sensitivity to disturbance at operational wind farms and that birds will nest within 200m to 300m of turbines (Whitfield and Madders, 2005). With that considered, it is likely that any disturbance/displacement impacts on hen harriers during the operation of the Proposed Development will be negligible and not significant.

Golden Plover

9.117 Some studies have reported evidence of reduced habitat usage by golden plover within varying distances of wind turbines, the most recent of which (Sansom *et al.,* 2016) suggested a significant reduction in the abundance of golden plover around an operational wind farm in the Scottish Highlands. The study concluded that disturbance activity during construction had no significant effect on golden plover breeding abundance or distribution. In contrast, once wind turbines were erected, golden plover abundance was significantly reduced within the wind farm (-79%) relative to the baseline, with no comparable changes in buffer or control areas. Golden plovers were found to be displaced by up to 400m from wind turbines during operation.

9.118 Pearce-Higgins *et al.*, (2009) reported evidence of reduced habitat usage by golden plover within 200m of wind turbines. In contrast, an updated study of displacement effects of wind farms on upland breeding birds, by the same lead author (Pearce-Higgins *et al.*, 2012), found little evidence for consistent population declines in golden plover.

9.119 Other studies involving long-term monitoring at wind farm sites found no evidence of displacement due to wind farm infrastructure in golden plover (Douglas *et al.*, 2011; Fielding and Haworth, 2013).

9.120 Whilst there is clearly some uncertainty over the extent of potential disturbance impacts on golden plover during wind farm operation (and impacts may vary from site to site), a more important factor in golden plover distribution could be habitat suitability. Although small numbers of foraging or breeding golden plover may be displaced by operation of the Proposed Development, there is alternative foraging habitat in the surrounding area, and it is likely that any displaced birds would

relocate to suitable habitat available nearby. If a precautionary approach is adopted here (based on the worst-case scenario reported by Sansom *et al.* (2016)), the loss of two golden plover breeding territories represents approximately 0.12% of the NHZ 6 population and is therefore not significant. As such, the potential effect as a result of displacement during wind farm operation is considered not significant for golden plover.

Barrier effect

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

9.122 There is little evidence to suggest that the Proposed Development lies on a migratory/regular commuting route for golden eagle, hen harrier and golden plover, therefore barrier effect is not anticipated for these species.

9.123 Baseline surveys showed that white-tailed eagles utilise the site for commuting between nesting and roosting sites and also coastal feeding areas. However, there is little evidence to suggest that operational turbines significantly alter the flight activity of white-tailed eagles (May *et al*., 2011). Despite the potential for a barrier effect to occur as a result of the Proposed Development, it is unlikely that this ten-turbine development will have more than negligible effect on local white-tailed eagle population. It is therefore considered likely that any barrier effects caused by the turbines will be insignificant for white-tailed eagle.

Collision with Wind Turbines

9.124 Collision of a bird with turbine rotors is almost certain to result in the death of the bird. In low density populations (e.g. raptors) this could have a greater negative effect on the local population than in higher density populations (e.g. passerines) because a higher proportion of the local population would be affected in a low density population. Larger birds such as raptors also live longer and have much slower reproductive rates than passerines, which can also increase the significance of the impact of collisions on the relevant population. The frequency and likelihood of a collision occurring depends on a number of factors which include aspects of the size and behaviour of the bird (including their use of a site), the nature of the surrounding environment, and the structure and layout of the wind turbines.

9.125 Collision risk is perceived to be higher for birds that spend much of the time in the air, such as foraging raptors and those that have regular flight paths between feeding and breeding/roosting grounds (e.g. geese). The risk of bird collisions at wind farms is greatest in areas where large concentrations of birds are present (such as on major migration routes), and in poor flying conditions, such as rain, fog, strong winds that affect birds' ability to control flight manoeuvres, or on dark nights when visibility is reduced (Langston and Pullan, 2003; Drewitt and Langston, 2006 and references therein). Birds may also be more susceptible if the wind farm is located in an area of high prey density. For diurnal foraging raptors, the proximity of structures on which to perch can increase the likelihood of collision with wind turbines (e.g. Percival, 2005 and references therein).

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

9.127 Passerines nesting within a wind farm site would be expected to be regularly flying between wind turbines and could therefore be expected to be most at risk of collision. However, passerines tend to fly below PCH and evidence suggests that passerines collide with wind turbines infrequently. Moreover, most of the species concerned are of low or negligible conservation value. Collision is therefore mainly considered in relation to species of high sensitivity, e.g. target raptor species and species not particularly maneuverable in flight, such as geese and swans.

9.128 Species with sufficient data (minimum of three flights per season and/or minimum of 10 birds) to undertake CRM are considered at risk of collision with the proposed wind turbines at the site. The species that met this criterion and were subject to CRM are as follows:

- white-tailed eagle;
- golden eagle;
- hen harrier; and
- golden plover.

9.129 For all other species, the number of flights within the CRZ, i.e. flights through the WP at PCH, was so low that CRM was not warranted and collision risk is considered negligible.

White-tailed Eagle

9.130 Observational studies of white-tailed eagles have illustrated that they are vulnerable to collisions with operational turbines. According to the ongoing German (Brandenburg state) review of bird collisions with turbines in the EU, there have been 333 recorded white-tailed eagle fatalities (Dürr, 2020). The majority of these collisions have been in Germany, Norway and Sweden. This number does not include three known Scottish fatalities, including one at the adjacent Edinbane wind farm on 25/05/16 that was found below the turbine at NGR NG 354492. No known fatalities have been recorded at the wind farm since.

9.131 At Smøla wind farm in Norway, April and May were the months with the highest collision frequencies, with 13 (c. 36%) and nine (c. 25%) of the known fatalities (Nygard *et al.* (2010). Several observers have noted that white-tailed eagles at Smøla often circle close to and around turbines, possibly induced by the extra wind energy created by the turbulence. Satellite-tagged casualties were either killed in their first autumn (two in September) or in the following spring (two in April). The first autumn incidents may be influenced by lack of agility and experience, their naivety making them more prone to collisions.

9.132 This is reiterated by the fact that NatureScot have retained the default avoidance rate of 95% for this species at the last review of such rates, where most species were elevated to 98% (SNH 2016c). This avoidance rate is an integral element of the collision risk modelling method given in Band (2007).

9.133 The white-tailed eagle flight activity survey data for the Proposed Development is shown on **Figure 9.1.3** (Year 1) **and Figure 9.1.7** (Year 2). Flights in Year 1 were equally distributed across the site however, some flight activity was also recorded to the south. In Year 2, fewer flights were recorded some of which originated and headed towards the east of the site. Collision risk analysis has been carried out on flight activity data including two breeding seasons and two non-breeding seasons. Based on these data, 34 white-tailed eagle flights were recorded at PCH within the CRZ. Assuming a 95% avoidance rate, 1.38 collisions per year (approximately one collision every 0.72 years) were predicted, with very similar predicted mortality in both the breeding and non-breeding seasons (for details see **Technical Appendix 9.3**).

9.134 Assuming worst case scenario that the mortality would involve breeding adults, the annual predicted collision mortality rate of 1.38 represents 0.56% of the Scottish breeding population (244 adults in 2017), 3% of the NHZ 6 population (assumed to be 46 adults in 2013) and 3.14% of the population on the Isle of Skye (assumed to be 44 adults in 2020). Against background annual mortality of 6.4% for adults (>3 years old) (Green *et al.,* 1996) (which amounts to 2.82 birds on Skye), this represents an increase of 48.9% in adult mortality. However, the background annual mortality for birds younger than three years of age is high (60.5%), therefore it is reasonable to suggest that an annual increase of 5.2% in birds >3 years old mortality would not be significant.

9.135 The above assessment is conducted using a white-tailed eagle-specific avoidance rate as currently recommended by NatureScot, that of 95%. However, there is a body of evidence based on empirical data suggesting that an avoidance rate of 98% is more realistic for white-tailed eagle. A detailed review of the white-tailed eagle collision mortality and a discourse on the validity of the 95% avoidance rate being used as a standard for white-tailed eagle in the NatureScot collision risk model is provided in **Technical Appendix 9.4** (Confidential).

9.136 If an avoidance rate of 98% was used in this case, it would result in 0.5518 collisions per year (approximately one collision every 21-22 months). This would represent 0.23% of the Scottish breeding population, 1.2% of the NHZ 6 population, and 1.25% of the population on the Isle of Skye. These collision estimates are highly unlikely to cause a measurable effect on the local and regional population of white-tailed eagle, and therefore the effect on the population as a result of the Proposed Development would not be significant.

9.137 To further investigate the potential impacts of collision risk resulting from the Proposed Development on the local and regional populations of white-tailed eagle, future population trajectories were investigated using population modelling. The modelling was conducted by Natural Research Projects (NRP) and detailed methods and findings are provided in **Technical Appendix 9.6**.

9.138 The authors of the population modelling remarked that a national rather than a regional population model is the appropriate scale for modelling white-tailed eagles. The rationale for a national, rather than a regional model, is based on the findings of Whitfield *et al.,* (2009) who examined natal dispersal rates in the Scottish population meaning that it is very unlikely that birds breeding on Skye and the Hebrides are isolated from other populations. A model restricted to the Skye or the NHZ 6 would be conservative. Nonetheless, the potential impacts of additional mortality were modelled at the two smaller scales: Skye and NHZ 6.

9.139 The modelling approach used an adapted Population Projection Matrix (PPM), allowing incorporation of wind farm mortality (a predicted mortality rate of 1.34 individuals per year was

used[2]) and of density dependence (the latter occurs when population growth rates are regulated by the density of a population).

9.140 The models are built around six age classes (only the adult class is assumed to fledge young in these models). The impact of wind farm mortality, for a long-lived species such as the white-tailed eagle, is partly dependent on the age classes of the birds killed. Generally, killing adults has a larger impact. In order to model these, three scenarios were run. The first model assumed that all mortality is to sub-adults, in the second model, collision mortality was split evenly between sub-adults and adults and in the third model, all collision mortality was assumed to be adults. Each model (combination of region, mortality rate and presence or absence of density dependence) was simulated 1,000 times with a 30-year projection.

9.141 None of the 30,000 modelled scenarios resulted in population extinction nor were any of the year 30 population totals lower than the starting values, even at the highest mortality rates.

9.142 The assumed NHZ 6 starting population in the models was 120 sub-adults and 78 adults. Depending on the ages of the birds killed 1.3 deaths represents 1.1% of the sub-adults, 1.7% of the adults or 0.7% of all birds. This scale of mortality is not predicted to have a significant impact.

9.143 The assumed Skye starting population in the models was 50 sub-adults and 50 adults. Depending on the ages of the birds killed 1.3 deaths represents 2.6% of the sub-adults, 2.6% of the adults or 1.3% of all birds. This scale of mortality is also not predicted to have a significant impact.

9.144 Despite potentially limiting the overall population size, the modelled additive mortality levels would not cause a population decline or extinction (across either population) and would only reduce the rate at which population growth occurs.

9.145 In the context of an increasing white-tailed eagle population on Skye, the above evidence indicates that potential collision impacts caused by the Proposed Development would be of no significance for white-tailed eagle at the regional level.

Golden Eagle

9.146 On the basis of the assumption that golden eagles tend to be displaced from wind farms, it would be expected that the collision risk prediction would be correspondingly low.

9.147 The golden eagle flight activity survey data for the Proposed Development is shown on **Figure 9.1.5** (Year 1) and **Figure 9.1.9** (Year 2). Flights recorded in Year 1 and Year 2 were similarly distributed over the site, occurring both over the site as well as over the ridge to the east. Collision risk analysis has been carried out on flight activity data from two full breeding seasons and two full winter seasons. Based on these data, 19 golden eagle flights were recorded at PCH within the CRZ during surveys. Assuming a 99% avoidance rate, there was a mean annual collision rate of 0.1550 (approximately one collision every 6.45 years) predicted.

[2] A predicted mortality rate of 1.34 individuals per year was used for the modelling since this was undertaken prior to the final turbine design. The calculated revised 1.38 rate (difference of 0.04) resulting from the final design is not predicted to change the conclusions of the modelling.

9.148 The potential loss of between 4-5 golden eagles over 30 years can be put into the context of background mortality rate data. Data indicates an annual adult survival rate of between 95.85 to 97.5% in Western Scotland (Watson, 2010). There is little data on pre-adult survival rates, but there is emerging evidence that they are substantially lower (Watson 2010). Pre-adult survival in eagles probably varies considerably, both between populations and between different time periods in the same population. In the absence of immigration/emigration, the maintenance of a stable population over time will be achieved through the combined effects of adult mortality and pre-adult mortality. The length of the pre-adult period will also vary between populations (Watson 2010). For populations with high productivity and high adult survival, then a pre-adult survival of c.10% may be sufficient to maintain a stable population (e.g. on Skye, Watson 2010). Elsewhere in western Scotland, where breeding productivity is lower, pre-adult survival may be c.15% in order to maintain the population.

9.149 Using a scenario of an annual increase in adult mortality of 0.1550 in the breeding population of NHZ 6 (148 adults) with a background mortality rate of 4.15% (6.14 per year), this amounts to an increase in mortality of 2.5% above background rates. Using a scenario of a background mortality of 2.5% (3.7 per year), this amounts to an increase in mortality of 4.2% above background rates. These are highly conservative estimations, and two caveats should be applied to these predictions:

- the NHZ 6 population estimate (Wilson *et al.,* 2015) is based on 2003 survey data and is likely to have increased (based on the trend recorded in the Hebridean Islands area between 2003 and 2015, Hayhow *et al.* (2017)); and

- collision events are possibly more likely to affect less experienced sub-adult birds which are not part of the breeding population, and which have a naturally higher mortality rate.

9.150 According to the ongoing German (Brandenburg state) review of bird collisions with turbines in Europe, there have been 22 recorded golden eagle fatalities (Dürr, 2020). These collisions have been in Spain (8 collisions), Norway (2 collisions) and Sweden (12 collisions), although collisions are most likely underreported as not all countries monitor and share their collision fatalities data. Currently, it seems there have been between three and five golden eagle collision deaths at Scottish wind farms spread over more than 20 years (Fielding *et al.,* 2022).

9.151 Furthermore, extensive analysis of satellite tracking records suggests that golden eagles rarely approach turbines (Fielding *et al.*, 2022, 2021). A study conducted at two wind farms in the central Highlands of Scotland showed that although golden eagles were closer to turbine locations in preferred habitat, they were at greater distances after turbines became operational (Fielding *et al.,* 2022). At higher wind speeds golden eagles flew closer to operational turbines; particularly those turbines in more preferred habitat (higher GET score). After turbines became operational, golden eagles effectively abandoned inner turbine locations, and flights close to rotor blades appeared to be rare (Fielding *et al.*, 2021). The authors of the study (who are the leading experts on golden eagle ecology and behaviour in Scotland) suggested that it is habitat loss and not probability of collision that constitutes the main impact of wind farms in Scotland for golden eagle.

9.152 Based on the above, it can be concluded that collision risk would be low for this species in the context of the Proposed Development. On the basis of 4-5 predicted golden eagle collisions during the lifetime of the Proposed Development, this is not considered significant at the NHZ level. It should also be stressed that if operational displacement occurs as predicted, collision risk is likely to be lower than the numbers presented here.

Hen Harrier

9.153 The hen harrier flight activity survey data for the Proposed Development is shown on **Figure 9.1.4** (Year 1) and on **Figure 9.1.8** (Year 2). Flight activity over the site was sporadic and occurred mainly to the south. Collision risk analysis has been carried out on flight activity data from two full breeding seasons and one full winter season (no flights were recorded in the second winter season). Based on these data, eight hen harrier flights were recorded at PCH within the CRZ during surveys. Assuming a 99% avoidance rate, there was a mean annual collision rate of 0.0352 (approximately one collision every 28.37 years) predicted.

9.154 If predicted annual mortality of 0.0352 individuals per year relates to individuals from the breeding population, this equates to 0.05% of the estimated breeding population of NHZ 6 (76 individuals, Wilson *et al.*, 2015) and represents less than 0.004% of the Scottish breeding population (920 breeding individuals; Wotton *et al.*, 2018).

9.155 It is likely that, even if actually realised, the predicted collision rate of one bird within the lifespan of the Proposed Development would not result in a population decline of hen harriers breeding in NHZ 6 (based on the precautionary assumption that all birds are NHZ breeding birds). In the context of background annual adult mortality of 19% (BTO Birdfacts), which amounts to 14.4 birds in the context of the NHZ 6 population of 76, the additional annual mortality of 0.0352 birds is not significant for hen harrier (0.24% increase on background mortality).

9.156 Thirteen hen harrier collisions have been reported at European wind farms, six of which were in the UK (Dürr, 2020). Whilst it is acknowledged that there may be other, unpublished collisions of this species, hen harrier collisions nevertheless appear to be an uncommon event. As such, the potential impact as a result of collision risk is considered to be not significant for hen harrier.

Golden Plover

9.157 The golden plover flight activity survey data for the Proposed Development is shown on **Figure 9.1.6** (Year 1) and **Figure 9.1.10** (Year2). Flights were recorded predominantly around the centre of the site, south of the Ben Sca ridge where there are breeding territories. Collision risk analysis has been carried out on flight activity data from two full breeding seasons and two full winter seasons. Based on these data, 18 golden plover flights were recorded at PCH within the CRZ during surveys. Assuming a 98% avoidance rate, there was a mean annual collision rate of 1.7474 (approximately one collision every six months) predicted. The highest predicted collision risk (of 3.0940 birds per season) is outside of the breeding season due to the presence of aggregations of up to 45 birds, which were commuting or on passage (October 2021 to March 2022).

9.158 If predicted annual mortality (1.7474 individuals per year) relates to individuals from the breeding population, this equates to 0.05% of the estimated breeding population of NHZ 6 (3,212 individuals; Wilson *et al.*, 2015) and is negligible in the context of the Scottish breeding population (74,960 breeding individuals; Wilson *et al.*, 2015). If actually realised, the predicted collision rate of 1.7474 birds per year would not result in a population decline of golden plover breeding in NHZ 6 (based on the precautionary assumption that all birds are NHZ breeding birds). In the context of background annual adult mortality of 27% (BTO Birdfacts), which amounts to 867 birds in the context of the NHZ 6 population of 3,212 birds, the additional annual mortality of 1.7474 birds is not significant for golden plover (increase of 0.2% on background mortality).

9.159 However, the mean annual collision rate was inflated by the high rate calculated for the non-breeding season (3.0940 collisions per season). If this rate was realised every season, it would equate to 94 collisions throughout the lifespan of the Proposed Development, which would represent between 0.009% and 0.01% of the Scottish wintering population of golden plover (based on the estimation of 25,000-35,000 wintering birds).

9.160 According to NatureScot guidance (SNH, 2018a) biogeographical zone assessments are best applied where species have relatively stable distributions (such as during the breeding season) or where species occupy a habitat in the non-breeding season that is consistent and predictable. However, no winter population estimates are given for golden plover at the NHZ level, and there is no suitable alternative regional scale available for the assessment. The majority of golden plover spend winter on the east coast of Scotland, and the Isle of Skye holds only sporadic birds in small sized flocks (not exceeding two-digit levels based on the Wetland Bird Survey (WeBS) (WeBS Report online). The flock of 45 golden plover (which contributed to the high seasonal mortality rate) was recorded over the Proposed Development on 26 March 2020 and was most likely associated with passage birds moving north (a northward movement of golden plover returning to Iceland commences as early as the end of March (Forrester *et al.,* 2007)). With spring passage of golden plover in Scotland in the region of 10,000-30,000 birds (Forrester *et al.,* 2007), it is difficult to put this into local context of the Proposed Development.

9.161 Collision risk for waders is generally deemed to be low, due to a relatively low cursory flight path, coupled with high flight manoeuvrability (Mc Guinness e*t al.,* 2015). A review of pan-European collision assessments revealed much lower golden plover collision records than other species, though this was not controlled for survey effort or corpse recovery rates (Hötker *et al.,* 2006). Golden plover collisions with turbines are relatively rare (42 golden plover collisions have been reported at European wind farms, none of which were in the UK (Dürr 2020)). The relatively high mortality rates predicted for golden plover derive from a very low number of flights comprising a high number of individuals. In the unlikely event of these rates being realised, accounting for the size of the NHZ 6 breeding population and the size of the national wintering population, a measurable effect on the local golden plover population is considered to be unlikely. As such, the potential collision effects on golden plover during the operational phase are considered to be not significant.

Decommissioning Effects

9.162 Potential effects associated with decommissioning of the Proposed Development are assumed to be similar to those identified for construction phase (i.e. habitat loss and disturbance/displacement). Decommissioning effects are therefore not considered separately for each species.

9.163 Due to the length of the operational period (40 years) the future composition of the bird community at the site is not known and the confidence in any prediction would be uncertain. In the absence of mitigation, decommissioning could cause short term effects through disturbance. Positive effects however, might also occur through the removal of turbines and the reinstatement of topsoil. Good practice measures, similar to those employed during the construction phase, including surveys prior to decommissioning, to inform an up-to-date assessment of potential effects on important bird species, would be implemented during decommissioning. Following the implementation of these measures, no significant effects would be anticipated.

Mitigation, Compensation and Enhancement

9.164 No specific mitigation measures are required for the operational phase. However, compensation and enhancement measures are proposed in the form of the Habitat Management Plan (HMP), which would remain in place during the operational phase.

9.165 An Outline HMP has been prepared and is available in **Technical Appendix 8.5**. A detailed HMP would be prepared at a later stage, which will primarily focus on the restoration of peatland habitat within the afforested area to the north of the site – *c.*77.75ha in total – in order to provide nature conservation enhancements that would apply for the lifetime of the Proposed Development with positive effects felt thereafter. The increase in peatland habitat therefore has the potential to increase the amount of breeding and foraging habitat for some bird species (hen harrier and golden plover in particular).

9.166 Further details of measures to be included in the HMP to benefit habitats and non-avian species are included in **Chapter 8: Ecology** and **Technical Appendix 8.5**.

Further Survey Requirement and Monitoring

9.167 The key issues for consideration are raptor flight activity, the potential for displacement from the Proposed Development to other adjacent areas and the potential for collision as it is important that any monitoring programme addresses the species that may be affected by the Proposed Development. It should be recognised however that 'such monitoring should only be required where there is a gap in understanding or where the scale and extent of impact is uncertain' (SNH, 2009).

9.168 The post consent ornithological monitoring programmes for the adjacent Edinbane Wind Farm and Ben Aketil Wind Farm have produced a vast amount of information over a long period of time, and it is broadly understood how raptors respond to operational wind farms in this part of Skye. The operational monitoring data show that there is some displacement of flight activity away from the turbines although this has not apparently affected the long-term population trends for golden eagle which remain stable and white-tailed eagle which have increased. What is not fully understood, however, is the change in potential cumulative effect on the populations of both eagle species on the Isle of Skye as an increasing number of renewable energy developments are brought forward.

9.169 Post consent monitoring requirements should be coordinated with the adjacent consented wind farms of Ben Sca and Extension and Glen Ullinish. The exact scope of works would be confirmed after consultation but is likely to include collision monitoring, flight activity surveys and breeding raptor surveys. It is important that any monitoring is designed to assess the actual versus predicted impacts on birds and to allow for a flexible monitoring plan to be undertaken during the post consent period.

9.170 It is proposed that ornithological monitoring should take place during and post-construction, in line with NatureScot guidance (SNH, 2009) as outlined below:

- year-round collision monitoring: carcass searches, carcass persistence trials and observer efficiency trials should be completed at least once per month throughout the year, to determine whether actual bird collisions are in line with predicted values. Carcasses of all species found on site should be recorded;

- flight activity surveys should be undertaken from the same VP locations used during baseline surveys to monitor the flight activity of target species. This would help establish any disturbance/displacement effects of the operational turbines on the resident bird species; and

- targeted raptor surveys should also be undertaken to monitor the status of ground-nesting raptor species within the vicinity of the Proposed Development, in order to further determine the displacement effect.

9.171 Given the broad range of existing data, a reduced but flexible monitoring programme is recommended and should be undertaken at reasonable intervals throughout the lifespan of the Proposed Development. For example, the above monitoring can take place annually during construction, and after the Proposed Development becomes operational, during years 1-3, 5, 10 and 15, with the requirement for further surveys to be determined based on previous survey results.

9.172 Availability of carrion is a key aspect influencing eagle flight activity in a particular area. It is recommended that fallen stock/deer removal within 500m of each turbine is carried out. It is recommended that a plan for compliance with this proposal is secured via planning condition.

9.173 Furthermore, it is proposed that a close collaboration with the HRSG is established in order to facilitate a research programme aimed at furthering understanding of white-tailed eagle and golden eagle population prospects in the light of an increasing number of renewable energy projects on the Isle of Skye. The overarching objective of this research programme would be the monitoring of the breeding populations of the two eagle species, and the effects of the wind farm developments in the northern part of Skye on these species. It is envisaged that GPS technology would be used to understand eagle movement patterns and use of breeding and non-breeding areas. This approach would allow the exploration of their habitat use and home ranges across the annual cycle, and also to monitor any collisions and displacement effects that might occur as a result of operational and proposed wind farm developments.

9.174 This research initiative would work best as a collaborative effort between a number of wind farm developers whose renewable energy assets are located in the northern part of Skye and the Applicant is committed to pursuing these discussions through the Skye Developer Forum. It is proposed that the Proposed Development would investigate contributing to the funding for an eagle research programme. This proposal could form a planning condition for the Proposed Development.

Residual Effects

9.175 During construction, it is predicted that there will be no significant residual effects on white-tailed eagle, golden eagle, hen harrier or golden plover. Other than the employment of good practice measures during construction, it is not anticipated that further mitigation would be required.

9.176 During operation, the potential loss of foraging habitat for non-breeding golden eagles and the potential impact of collision mortality on white-tailed eagles would be of low significance. All other potential impacts on white-tailed and golden eagles would be non-existent or of negligible significance. It is proposed that post consent monitoring is undertaken to assess these effects further.

9.177 During operation, it is predicted that there will be no significant residual effects on the other species assessed (hen harrier and golden plover).

SUMMARY OF PREDICTED EFFECTS

9.178 Following the implementation of a range of good practice measures as detailed throughout this chapter, no significant negative effects on any of IOFs (i.e. white-tailed eagle, golden eagle, hen harrier and golden plover) are predicted during the construction phase of the Proposed Development.

9.179 During operation, potential displacement of golden eagle from foraging could occur and this could constitute a negative effect on this feature at a local level, but this is not considered to be significant. Collision risk mortality is predicted to affect white-tailed eagle, golden eagle, hen harrier and golden plover, but the predicted mortality for these species is not considered significant.

9.180 During decommissioning, as during construction, potential displacement effects are possible, but a basic monitoring programme for breeding waders and raptors will inform any potential impacts here and following the implementation of a range of accepted good practice measures no significant negative effects on IOFs are predicted.

CUMULATIVE EFFECTS ASSESSMENT

9.181 The following section assesses the potential cumulative effects on IOFs from the Proposed Development along with all other operational, consented and submitted plans or projects within an appropriate zone of influence and against the relevant NHZ population estimates, following NatureScot guidance (SNH, 2018c).

9.182 In line with this guidance, any wind farm developments of fewer than three turbines (small scale wind energy proposals (SNH, 2016d)) were excluded from the cumulative impact assessment, due to the problems associated with finding appropriate data for developments of this size. Only IOFs for which a greater than negligible residual impact is predicted are considered in the cumulative impact assessment, as negligible impacts will not result in a detectable increase in cumulative impacts.

9.183 All existing, consented and submitted wind farm developments (of three or more turbines) and other projects within 10km of the Proposed Development, were considered as part of the assessment of cumulative impacts (these are shown in **Table 9-8**).

Table 9-8: Projects Considered for Cumulative Effects Assessment

Project	Status	Distance from Proposed Development (km)	No. of Turbines	Information Available	Species Assessed
Ben Sca and Extension	Approved	0.7	9	ES available	White-tailed eagle, golden eagle, hen harrier, golden plover
Ben Aketil and Extension	Operational	1.3	12	ES and post consent monitoring reports available	White-tailed eagle, golden eagle, hen harrier, merlin, peregrine, golden plover, short-eared owl
Edinbane	Operational	0.5	18	ES (section 42 variation) and post consent monitoring reports available	White-tailed eagle, golden eagle, hen harrier
Glen Ullinish	Approved	2.8	11	ES available	White-tailed eagle, golden eagle, hen harrier
Beinn Mheadhonach	Approved	9	4	ES available	White-tailed eagle, golden eagle, red-throated diver, short-eared owl
Skye Reinforcement Project	Application	1.5	Overhead transmission line	ES available (Ornithology Chapter confidential)	White-tailed eagle, golden eagle, red-throated diver and common scoter

9.184 Potential cumulative effects from the Proposed Development include potential habitat loss and collision mortality for white-tailed eagle, golden eagle, hen harrier and golden plover.

9.185 There are a number of proposals within the Isle of Skye which are subject to scoping requests (**Figure 5.1b**), however, they are not included in this cumulative assessment of effects due to the lack of firm information on which to base the assessment.

Cumulative Loss of Habitat for Sub-Adult Golden Eagles

9.186 The Edinbane Section 42 variation ES (Vattenfall 2009) calculated that the cumulative loss of sub-adult golden eagle habitat due to the construction of Ben Aketil and Edinbane Wind Farms was 10.26km² (2.3% of the total for Skye). As these wind farms are on the edge of the largest block of potential sub-adult habitat on Skye (143.75km^2) it was concluded that it was unlikely that the cumulative loss of sub-adult habitat, resulting from the construction of the two wind farms, would have a significant impact on the local or regional golden eagle population. The lack of any significant

impact being a consequence of the location of the wind farms on the edge of the largest patch and the small footprint area of the development.

9.187 If the area of potential habitat loss from the Proposed Development is assumed to be that within a 500m buffer of the proposed turbines, this amounts to approximately 4.2km². Furthermore, this includes some overlap of existing habitat loss from Ben Aketil, Edinbane and Ben Sca Wind Farms plus an area of forestry. The additional potential area of habitat loss is therefore highly unlikely to have a significant cumulative impact on the local or regional golden eagle population.

9.188 Habitat loss arising from the construction of the Skye Reinforcement Project is unlikely to result in adverse impacts upon any bird species. Any impacts are likely to be negligible and not significant.

Cumulative Collision Risk Mortality

9.189 Collision rates for white-tailed eagle, golden eagle, hen harrier and golden plover from the cumulative wind farm projects and the Proposed Development are presented in **Table 9-9**. Population reductions due to collision mortality at Section 1 of the Skye Reinforcement Project (the section close to the Proposed Development between Edinbane and Sligachan) were deemed to be minimal and the residual effects on all bird species were negligible and therefore not significant. As such, the effects of the Skye Reinforcement Project are not included in the cumulative assessment of collision effects.

Table 9-9: Summary of Cumulative Effects – Collision Mortality (Collisions per Year)

Project	White-tailed eagle	Golden eagle	Hen harrier	Golden plover
Proposed Development	1.38	0.155	0.035	1.75
Ben Sca + Extension	0.51	0.08	0.096	0.33
Ben Aketil	0.05	0.04	0.11	0
Edinbane	0.06	0.277	0.049	0
Glen Ullinish	1.12	0.195	0	0
Beinn Mheadhonach	0.29	0.032	0	0
Cumulative total	**3.41**	**0.779**	**0.29**	**2.08**

White-tailed Eagle

9.190 Assuming the worst-case scenario that the mortality would involve breeding adults, the annual cumulative predicted collision mortality of 3.41 represents 1.4% of the Scottish breeding population (244 adults in 2017) and 7.75% of the population on the Isle of Skye (assumed to be 44 adults in 2020). Against background annual mortality of 6.4% for adults (>3 years old) (Green *et al.,* 1996) (which amounts to 2.82 birds on Skye), this represents an increase of 121% in adult mortality on Skye. However, the background annual mortality for birds younger than three years of age is high (60.5%, which amounts to 26.62 birds on Skye), therefore it is reasonable to suggest that an annual increase of 12.8% in birds >3 years old mortality would not be significant.

9.191 The potential cumulative impacts of collision risk resulting from the Proposed Development on the local and regional populations of white-tailed eagle, future population trajectories were investigated using population modelling (**Technical Appendix 9.6**).

9.192 The assumed NHZ 6 starting population in the models is 120 sub-adults and 78 adults. Depending on the ages of the birds killed the cumulative collision mortality of 3.4 birds per year represents 2.8% of the sub-adults, 4.4% of the adults or 1.7% of all birds. This scale of mortality is not predicted to have a significant impact although there would be a delay in reaching the carrying capacity.

9.193 The assumed Skye starting population in the models is 50 sub-adults and 50 adults. Depending on the ages of the birds killed the cumulative collision mortality of 3.4 birds per year represents 6.8% of the sub-adults, 6.8% of the adults or 3.4% of all birds.

9.194 The worst-case scenario is that all collisions would be adults and the population is not predicted to reach its carrying capacity within 30 years. However, the prediction of between 34 and 37 pairs (range 26 - 38 pairs) is still a significant increase from the present and well above the maximum predicted Skye population in Sansom *et al.* (2016). There is no prediction of a population decline.

9.195 A more realistic scenario is that the collision mortality will be split between sub-adults and adults. If an equal split is assumed, the prediction of between 36 and 37 pairs (range 29 - 40 pairs) to be present in Year 30 is made.

9.196 The overall effect of the levels of additional wind farm mortality modelled in this case is to reduce the year at which the population reach their carrying capacities. There is no threat to the integrity of the white-tailed eagle populations at even the highest rate of modelled mortality. As such, the additional cumulative predicted collision mortality for white-tailed eagle is not considered to be significant.

Golden Eagle

9.197 Vattenfall (2009) presented the results of population modelling exploring a range of scenarios with regard to potential cumulative collision mortality affecting golden eagles within NHZ 6 and on Skye. This concluded with some certainty that the golden eagle populations (Skye and NHZ) are currently secure and reasonably well buffered against some moderate increases in mortality, even if the annual productivity declines.

9.198 Vattenfall (2009) further states that the scale of impact that could be tolerated by the two populations (NHZ and Skye) is different, with the smaller Skye population being more sensitive. For example, there is little evidence that either Edinbane or Ben Aketil Wind Farms would have a significant impact on the survival of adult, range-holding birds. Increasing the mortality to this section of the population is much more significant than additional sub-adult mortality. The conclusion was that the future of the Skye population could be compromised if additional sub-adult mortality rises much above 1.0 per year.

9.199 Most recently, Muirhall Energy (2020) presented the results of population viability modelling, assuming a mortality rate of 0.59 birds per year, that predicted no significant effect on the positive population growth rate for golden eagle.

9.200 The additional cumulative predicted collision mortality of 0.78 (which given the evidence from the neighbouring wind farm developments to date is likely to be an over-estimate) is therefore not

considered to be significant, as it stays well below figure of 1.0, considered a safe level of additional mortality for golden eagle population on Skye.

Hen Harrier

9.201 The potential loss of an additional 0.29 hen harriers per annum, or up to nine over the life of the five wind farms is unlikely to have any discernible adverse impact on the Western Seaboard NHZ population, which has been assessed to be in a favourable conservation status (Fielding *et al.,* 2011).

Golden Plover

9.202 The only other wind farm predicting collision mortality for golden plover is Ben Sca, therefore the predicted cumulative total is not much higher than that for the Proposed Development. The potential loss of approximately 62 birds over the life of the five wind farms is not considered significant in the context of the NHZ 6 population.

STATEMENT OF SIGNIFICANCE

Proposed Development

9.203 Following the implementation of good practice measures, no significant negative effects on IOFs are predicted during the construction or decommissioning phases of the Proposed Development. During operation displacement impacts are predicted for golden eagle; and collision mortality impacts are predicted for white-tailed eagle, golden eagle, hen harrier and golden plover. None of these impacts are predicted to be at a significant level.

Cumulative Effects

9.204 No significant cumulative negative effects on IOFs are predicted. During operation additional displacement impacts are predicted for golden eagle; and additional collision mortality impacts are predicted for white-tailed eagle, golden eagle, hen harrier and golden plover. None of these cumulative impacts are predicted to be at a significant level.

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