8 Ornithology

8.1 Introduction

8.1.1 This chapter considers the likely significant effects on ornithology associated with the construction and operation of the Killean Wind Farm (the Proposed Development). The specific objectives of the chapter are to:

- describe the current ornithological baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address the likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation measures.

8.1.2 The assessment has been carried out by Dr Steve Percival of Ecology Consulting. Further details of his qualifications and experience are provided in **Chapter 1: Introduction**.

8.1.3 The chapter is supported by a set of figures and the following Technical Appendices:

- **Technical Appendix 8.1**: Breeding Bird Survey 2022;
- **Technical Appendix 8.2**: Breeding Bird Survey 2023;
- **Technical Appendix 8.3**: Wintering Bird Survey 2021-22;
- **Technical Appendix 8.4**: Wintering Bird Survey 2022-23;
- **Technical Appendix 8.5**: Collision Risk Modelling Calculations;
- **Technical Appendix 8.6**: Draft Breeding Bird Protection Plan;
- **Technical Appendix 8.7**: Shadow Habitats Regulations Assessment (HRA); and
- **Technical Appendix 8.8:** Confidential Addendum on Breeding Birds.

8.2 Legislation, Policy and Guidance

8.2.1 The ornithological assessment followed the guidance produced by Scottish Natural Heritage (SNH) (now NatureScot) (SNH 2017). Additionally, the following documents were taken into account:

- The Wildlife and Countryside Act 1981, as amended;
- EU Council Directive 79/409/EEC and 2009/147/EC on the Conservation of wild birds (the 'Birds Directive');
- EU Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive');
- The Conservation of Habitats and Species Regulations 2017.
- Environmental Impact Assessment Directive 85/337/EEC (the EIA Directive);
- The Nature Conservation (Scotland) Act 2004;
- The Wildlife and Natural Environment (Scotland) Act 2011;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended).
- National Planning Framework 4 (NPF4) - sets out the spatial principles, regional priorities, national developments and national planning policy;
- Planning Advice Note (PAN) 1/2013 – Environmental Impact Assessment (Scottish Government 2013);
- PAN 51: Planning, Environmental Protection and Regulation (Scottish Government, revised 2006);
- PAN 60: Planning for Natural Heritage (Scottish Government 2000);
- Scottish Executive Circular 6/1995 EIR release (as amended June 2000). Information request and response under the Environmental Information (Scotland) Regulations 2004;
- Planning Circular 1/2017; Environmental Impact Assessment Regulations. Guidance on The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (Scottish Government, 2017);
- 'Managing Natura 2000 Sites' (European Communities 2000), which gives guidance on the implementation of the Birds and Habitats Directives;
- Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater and Coastal (CIEEM 2018);
- Recommended bird survey methods to inform impact assessment of onshore wind farms (SNH 2017a);
- Developing field and analytical methods to assess avian collision risk at wind farms (Band *et al*. 2007);
- Avoidance rates for the onshore SNH collision risk model (SNH 2017b);

- Assessing the significance of impacts from onshore windfarms on birds outwith designated areas: version 2 (SNH 2018a);
- Assessing the cumulative impact of onshore wind energy developments (SNH 2018b);
- Assessing connectivity with Special Protection Areas (SPAs) (SNH 2016a);
- Environmental Statements and Annexes of Environmentally Sensitive Bird Information Guidance for Developers, Consultants and Consultees. Version 2 (SNH 2016b);
- Good Practice during Wind Farm Construction (Scottish Renewables *et al*. 2019);
- Birds of Conservation Concern (BoCC) 5: the Population Status of Birds in the United Kingdom, Channel Islands and the Isle of Man (Stanbury *et al*. 2021);
- Argyll Local Biodiversity Action Plan (LBAP) and the Argyll and Bute Council
- Biodiversity Duty Action Plan;
- The UK Post-2010 Biodiversity Framework; and
- The Scottish Biodiversity List (SBL): https://www.nature.scot/doc/scottish-biodiversity-list)

8.3 Consultation

8.3.1 Consultation was undertaken primarily through the EIA Scoping process. The issues raised and key outcomes of this consultation relating to ornithology are summarised in **Table 8.1.**

Table 8.1: Consultation Responses – key points relating to ornithology.

Consultee and Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
Nature Scot 11/1/22	Baseline survey requirement	Confirmation of need for two full years of baseline data, despite data from previous application, given sensitivity of Greenland white-fronted geese and recent changes in local eagle range occupancy	Two years baseline survey have been undertaken, together with consultation with Argyll Raptor Study Group and RWE (regarding their Clachaig Glen site immediately to the south of Killean).

Consultee and Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
Royal Society for the Protection of Birds (RSPB) 3/11/23	Scoping Opinion	Welcomes the siting of the majority of the Proposed Development's infrastructure within commercial forestry plantation (a habitat considered to be of low biodiversity value).	Noted
		The ornithological chapter of the EIA should consider all the components of the proposal including ancillary/related development such as access roads, on-site tracks, borrow pits and grid connection. Disturbance, displacement (including barrier effects), loss of suitable habitat and collision risk should be assessed.	All addressed in this chapter.
		Recommends that survey work for key species continues throughout the consultation and consenting process	As two full years' data have been collected this is not considered necessary.
		Consider that the two northernmost turbines of the scoping layout have the potential to impact on Greenland white-fronted goose flightlines. Recommend that turbines are not sited along flight corridors, that an appropriate buffer is applied, and that a minimum turbine set-back of 1km from roost lochs is adopted as a precautionary measure (to accommodate low visibility/night flight variance and changes in use over time).	Two northernmost turbines have been removed so that all turbines now located outside main goose flight corridor. As noted by RSPB, no turbines are located within 1km of the main SPA goose roost lochs.
		Recommend enhancement measures should support red-throated diver and black grouse populations	Measures suggested by RSPB have been Included within outline Biodiversity Enhancement

Consultee and Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
			Management Plan (oBEMP) (Technical Appendix 7.6).
		Welcomes the Applicant's awareness of their obligations under NPF4. Recommend the Applicant provides sufficient information on proposals for enhancement to assure the Consenting Authority that the proposed development has satisfied the requirements under NPF4.	oBEMP includes such measures (Technical Appendix 7.6). For clarification the Habitat Management Plan (HMP) and BEMP are synonymous.
		A Natural Heritage Zone-level assessment of cumulative bird impacts in relation to consented projects and other developments in the planning system should be undertaken, in accordance with NatureScot guidance. This should include the Coalashee proposed wind farm.	Cumulative assessment for NHZ 14 has been carried out. It has not, however, included the Coalashee Wind Farm as an application has not yet been submitted, so there is no firm proposal to assess (or baseline bird data available).
NatureScot 28/10/23	Scoping Opinion	Advise that the proposal is likely to have a significant effect on the qualifying interests of the Kintyre Goose Roosts SPA and its associated SSSIs, so a Habitats Regulations assessment will be required. Effects on the geese could include collision mortality, barrier effects, disturbance during construction and operation, and cumulative effects (particularly with Coalashee wind farm).	Potential effects on Greenland white-fronted geese and this SPA have been assessed and an HRA report is included in Technical Appendix8.7. An application for the Coalashee Wind Farm has not yet been submitted so has not been taken into account in the cumulative assessment, as there is no firm proposal to assess.
		The surveys carried out appear sufficient, and the proposed approach to the assessment of impacts appears appropriate and in	Noted.

Consultee and Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		line with NatureScot guidance.	
		Recommend a buffer of at least 500 m between black grouse lek sites and turbines to minimise the risk of displacement during operation.	All of the regularly used leks have been buffered by at least 500m. There have been occasional records of up to two males lekking 300-500m east from the nearest proposed turbine but these have been at different locations along the forest track each time, and alternative locations >500m from proposed turbines were also used. Furthermore, black grouse will be a key component of the Biodiversity Enhancement Management Plan.
		Advise a 750 m buffer is applied around black grouse lek sites during construction before 9 am in April and May to minimise disturbance to lekking birds.	Included in construction mitigation (section 8.7)
		NS can provide a spreadsheet which summarises the collision risk for a range of sensitive bird species within NHZ14 for the cumulative ornithological assessment	This has been provided and included within the cumulative assessment (Table 8.16).
		NPF4 - The Scottish Government is developing separate guidance on Policy 3 to support delivery of biodiversity enhancement from these larger scale developments. In the meantime, aspects of our Developing with Nature guidance can usefully inform how to take account of biodiversity in development, including ensuring future management and monitoring	Noted

Consultee and Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		maintains the biodiversity enhancements desired in the long term.	
Campbeltown Community Council 4/10/23	Scoping Opinion	Bird surveys have been carried out between 2021 and 2023. During this period bird numbers have been significantly affected by bird flu and data collected may be much lower than previously.	Noted – bird numbers have been compared with pre-bird flu numbers to ensure baseline is robust. Key species at this site have generally been less affected by bird flu.

8.4 Methodology

Scope of Assessment

8.4.1 The key issues for the assessment of potential ornithological effects relating to onshore wind farms include the following, based on NatureScot (NS; formerly Scottish National Heritage (SNH)) guidance (SNH 2018a):

- direct loss of bird habitat through construction of wind farm infrastructure;
- disturbance of birds during construction and operation (including displacement of flight activity through barrier effects);
- mortality of birds through collision with wind turbine blades or towers during operation; and
- cumulative effects of wind farm operational disturbance and collision mortality, on the national and Natural Heritage Zone (NHZ) populations of key target species.

8.4.2 Key target species for the assessment have been identified following SNH 2018a guidance using the following criteria:

- species listed on Annex 1 of the EU Birds Directive;
- species listed on Schedule 1 of the 1981 Wildlife and Countryside Act;
- species identified by NatureScot (SNH 2018a) as 'Priority bird species for assessment when considering the development of onshore wind farms in Scotland'. These include (a) species that are widespread across Scotland which utilise habitats or have flight behaviours that

may be adversely affected by a wind farm, and (b) as 'restricted range' species; and
- red-listed species on the Birds of Conservation Concern list (Stanbury *et al*. 2021).

8.4.3 The ornithological assessment has, therefore, given particular consideration to all species recorded during the baseline surveys at the site that meet any of these criteria.

8.4.4 No ornithological issues have been scoped out from this assessment, though, following NS (SNH 2018a) guidance, the assessment has focussed on the key species likely to be affected by the Proposed Development.

Baseline Characterisation

Study Area

8.4.5 The ornithology study areas were chosen to include all areas within the potential zone of ornithological influence of the Proposed Development, with reference to NatureScot (SNH 2017) guidance. The site lies within the Argyll West and Islands NatureScot Natural Heritage Zone (NHZ 14). The specific study areas were as follows:

- Ornithological designated sites: sites designated for ornithological interests within 5 km of the site (all statutory protected sites) and within 20 km (internationally important sites), see **Figure 7.1**. for internationally important sites within 20km and **Figure 7.2** for nationally important sites within 5km.
- Core breeding and wintering bird surveys: included a minimum 500 m buffer from all of the Proposed Development infrastructure for the main breeding bird and winter walkover surveys ("the core bird survey area") covering a total area of 18.1 square kilometres (km^2), shown in **Figure 8.1**.
- Key species surveys ("the wider breeding bird survey area"): a 2 km buffer from all of the Proposed Development infrastructure, where access was possible, covering an additional 32 km^2.
- Flight Activity (Vantage Point) surveys as shown in **Figure 8.1**; and
- Cumulative Effects: other proposed developments within the 'Argyll West and Islands' NatureScot Natural Heritage Zone (NHZ 14) included in the assessment of potential cumulative ornithological effects.

Desk Study

8.4.6 The ornithological desk study provided information on the ornithological interest of the study area out to 20 km from the site, including the locations of any relevant statutory protected sites and collation of data on key species such as raptors and breeding waders. Data from the following sources of information were sought for the desk study:

- NatureScot website (https://sitelink.nature.scot/home) – statutory designated site boundaries, including SSSIs and SSSI citation details;
- Joint Nature Conservation Committee (JNCC) website (https://jncc.gov.uk/our-work/special-protection-areas-overview/) – European protected site boundaries and designations (SPA/Ramsar);
- Wetland Bird Survey annual reports (Woodward *et al*. 2024);
- The Birds of Scotland (Forrester *et al*. 2007);
- Bird Atlas 2007-11: The Breeding and Wintering Birds of Britain and Ireland (Balmer *et al*. 2013);
- Argyll Biological Records Centre (via the National Biodiversity Network website);
- Information published in Environmental Statements (ES) and EIA Reports for other developments in the Argyll West and Islands NatureScot Natural Heritage Zone (NHZ 14); and
- Argyll Raptor Study Group.

Field Survey

8.4.7 A comprehensive range of bird surveys have been undertaken at the site between September 2021 and August 2023. This has included surveys over two full breeding seasons (2022 and 2023) and two winter periods (2021-22 and 2022-23). These surveys comprised:

- year-round vantage point surveys to quantify bird flight activity;
- breeding bird walkover mapping survey;
- species-specific breeding bird surveys; and
- autumn/winter walkover surveys.

8.4.8 Full details of the surveys, dates and weather conditions are given in **Technical Appendices 8.1-8.4**.

Vantage Point (VP) Surveys (year-round)

8.4.9 VP surveys were carried out to determine flight activity within the site and its surrounds. The VP surveys quantified the bird numbers that could

potentially be at risk of collision (including roost flight observations at dawn/dusk). All flight lines of target species were mapped, and the flight height and duration of each flock/individual recorded. The following species were recorded:

- all birds of prey and owls;
- all waders (including lapwing and golden plover) and gulls;
- all ducks, geese, swans, cormorants, herons, coot and grebes;
- large flocks (>100 birds) of other species (except woodpigeon and rook); and
- any other notable species, including SNH 2018a priority species.

8.4.10 Two VPs were used, to give coverage of the site, including all turbine locations, and its surrounds. Computer GIS (Global Mapper v21)-generated viewsheds are shown in **Figure 8.1**. The same locations were used for all of the surveys, with the following surveys being undertaken at each VP:

- breeding season:
  - April-August 2022 - 60 hours/VP (basic 36 hours plus additional survey time, primarily for golden eagles).
  - April-August 2023 - 60 hours/VP.
- autumn/winter:
  - September-March 2021-22 - 58 hours (36 hours plus an additional 22 hours to enhance coverage of goose roost flights at dawn/dusk).
  - September-March 2022-24 - 58 hours (36 hours plus an additional 22 hours to cover goose roost flights).

Core Breeding Bird Walkover Surveys

8.4.11 The breeding bird walkover survey of the core bird survey area followed the standard Brown and Shepherd (1993) moorland survey method with two additional visits as recommended in SNH 2017 guidance. These surveys covered the site plus a 500 m buffer. The extent of the core breeding bird survey area is shown in **Figure 8.1**. Surveys were carried out as follows:

- 2022 - four visits during April–July; and
- 2023 - four visits during April-July.

8.4.12 All bird locations and behaviour were mapped at 1:10,000 scale, using the standard British Trust for Ornithology (BTO) Common Birds Census notation, and all species were recorded. In addition, the survey effort per unit area was standardised to make the surveys as repeatable as possible, recording systematically for approximately two hours per km^2. A route was

chosen to ensure that all parts of the ornithology study area were covered to within approximately 100 m of the observer, where access was possible. The survey route was plotted onto the survey map as it was undertaken.

8.4.13 The surveys avoided strong winds, heavy rain, fog and low cloud. Birds were located by walking, listening and scanning by eye and with binoculars. Standard BTO notation was used to record the birds' activities; singing, calling, carrying nest material, nests or young found, repetitively alarmed adults, disturbance displaying, carrying food or in territorial dispute.

8.4.14 The survey data were analysed to determine spatially distinct clusters of records, equivalent to breeding territories, with the number of such territories used to calculate the breeding population for each species (Gilbert *et al*. 1998). A record in potentially suitable breeding habitat on a single visit was considered sufficient to indicate a potential breeding attempt.

Species-specific Breeding Bird Surveys (Wider Area Surveys)

8.4.15 As the site and its surrounds supported potentially suitable habitat for a range of scarce raptors and black grouse, additional species-specific surveys were undertaken during March-August 2022 and 2023. Surveys were undertaken within the wider breeding bird survey area where potentially suitable breeding habitats for these species are present. Walkovers were carried out where access was allowed, supplemented by a series of mini-VPs (short watches from additional VPs) chosen to observe over all of the site plus a 2 km buffer. This comprised surveys for red-throated diver, black grouse, golden eagle, white-tailed eagle, osprey, goshawk, hen harrier, red kite, short-eared owl, barn owl, peregrine and merlin, following the standard methodologies detailed in Gilbert *et al*. (1998) and Hardey *et al*. (2013), as follows:

- black grouse surveys - dawn surveys during April-May 2022 and 2023 over 2-3 visits for each of the two baseline survey years; and
- raptor/owl surveys - walkover and mini-VP surveys, each month for each of the two baseline survey years during March-August 2022 and 2023.

8.4.16 In addition, any other key target species observed during these surveys were recorded.

Autumn/Winter Walkover Surveys

8.4.17 Walkover mapping surveys of the wintering birds within the core survey area took place in accordance with NS guidance (**Figure 8.1**). The survey focused on key target species, as set out above for the VP surveys. As well as counting and mapping each species, the behaviour of each flock was also recorded, e.g. feeding/roosting. The surveys included work at dawn and dusk to check the area specifically for roosting hen harriers and other important raptors, and were carried out as follows:

- 2021-22 - monthly surveys, September-March; and
- 2022-23 – monthly surveys, September-March.

Winter Waterfowl Feeding Distribution Surveys

8.4.18 Additional surveys were undertaken twice-monthly of all possible habitats that could be used by wintering waterfowl as feeding/roosting sites within up to 5 km of the site (to include all of the main Tayinloan/Rhunahaorine goose feeding area, i.e. the feeding area from which geese may move to/from across the Proposed Development site). These wider surveys gave contextual information about where goose feeding flocks were located, and provide further information in relation to the linkage to the Kintyre Goose Roosts SPA. The site lies within the potential SPA connectivity zone from this SPA (for which Greenland white-fronted geese are a qualifying feature) and within a known goose feeding area (SNH 2016a).

8.4.19 The counts were carried out as instantaneous 'look-see' counts, recording a snapshot of the birds present in each field/count sector at the time it was surveyed (Gilbert *et al*. 1998). One such count of each field was made each survey day, recording the numbers of all the key species present. Any additional records made outside this time were noted as supplementary records. These snapshot counts were organised to ensure that the full range of times of day were covered in each part of the survey area.

Collision Risk Modelling

8.4.20 To further inform the determination of the likelihood of potentially significant adverse effects occurring, collision risk modelling was carried out for all the key target species (as per NS guidance, SNH 2018a) recorded flying through the collision risk zone at rotor height: rotor height would be 25-180 m above ground level. Further details are provided in **Technical Appendix 8.5**.

8.4.21 The modelling included seven target raptor species (white-tailed eagle, golden eagle, osprey, red kite, hen harrier, peregrine and merlin), black grouse and golden plover. The collision risk for each of these species was modelled using the non-direct flight model. In addition, whooper swans, Greenland white-fronted geese, greylag geese, red-throated diver and herring gulls were observed flying through the collision risk zone and were also modelled to determine their collision risk. As their flights were largely direct ones through the site, the direct flight model was applied. No other key species was recorded flying through the collision risk zone at rotor height.

8.4.22 The collision risk model used in this assessment was developed by NS and British Wind Energy Association (BWEA) (Band *et al*. 2007). The model runs as a two-stage process. Firstly, the risk is calculated making the assumption that flight patterns are unaffected by the presence of the wind turbines, i.e. that no avoidance action is taken. This is essentially a mechanistic calculation, with the collision risk calculated as the product of (i) the probability of a bird flying through the rotor swept area, and (ii) the probability of a bird colliding if it does so. This probability is then multiplied by the estimated numbers of bird movements through the wind farm rotors at the risk height (i.e. the height of the rotating rotor blades) in order to estimate the theoretical numbers at risk of collision if they take no avoiding action.

8.4.23 The second stage then incorporates the probability that the birds, rather than flying blindly into the wind turbines, will actually take a degree of avoiding action, as has been shown to occur in all studies of birds at existing wind farms. NS has recommended a precautionary approach, using a value of 98% as a general default avoidance rate, 95% for white-tailed eagle, 99% for some other larger raptors (including golden eagle, red kite and hen harrier) and 99.8% for geese (SNH 2017b). This precautionary approach is useful as an initial filter to identify sites where collision risk is clearly not an issue, but does not necessarily provide a realistic estimate of actual likely collision rates when compared with data from existing wind farms. The magnitude of the impact was determined as a percentage increase in the existing baseline mortality (to put the potential wind farm mortality into the ecological context of the birds' population dynamics), though professional judgement was also applied in the assessment of any non-negligible magnitude collision risks predicted.

8.4.24 Details of the input data and the collision risk calculations are given in **Technical Appendix 8.5**. Body sizes and baseline mortality rates were taken from Robinson (2005) and flight speeds from Alerstam *et al*. (2007).

Assessment Methodology

8.4.25 The significance of the potential effects of the Proposed Development has been classified by professional consideration of the value of the receptor and the magnitude of the potential effect.

8.4.26 The assessment includes a full evaluation of the ornithological importance of the bird populations at the site and identification of any particularly sensitive areas. The assessment has been carried out with reference to the assessment methodologies produced by NatureScot (SNH 2018a) for the wider countryside, and the CIEEM (2018) Guidelines.

8.4.27 An assessment of the effects of the Proposed Development on European Protected Sites under the Habitats Regulations is presented separately in **Technical Appendix 8.7**.

Criteria for Assessing Value (Conservation Importance)

8.4.28 Value (conservation importance) was assigned using the criteria set out in **Table 8.2**, drawing upon those adopted by NS in Guidelines for Selection of Biological SSSI, using 1% of the resource to define international and national importance (very high and high values) (Woodward *et al*. 2024). An additional category of regional importance (medium value) was assigned for species approaching the threshold for national importance and those for which the survey area held a notable concentration in a county context. A further category of 'local importance' (low value) was used for species that did not reach regional importance but were still of some conservation interest. This included all species on the red or amber lists of the 'Birds of Conservation Concern' (Stanbury *et al*. 2021) that did not reach national or regional importance at the site. National reference populations have been taken from Woodward *et al*. 2020 and regional NHZ populations from Wilson *et al*. 2015. In addition, listing on Annex 1 of the EU Birds Directive, Schedule 1 of the Wildlife and Countryside and Scottish Biodiversity List (SBL) species were all considered in the evaluation process.

8.4.29 The value (conservation importance, as defined in **Table 8.2**) of the receptors present in the 20 km study area were identified, then the

magnitude of the possible impact on those receptors determined (as described in **Table 8.3**).

Table 8.2: Value (conservation importance) of bird species

Value	Definitions
Very High	Cited interest of SPAs, Special Areas of Conservation (SACs) and SSSIs. Cited means mentioned in the citation text for those protected sites as a species for which the site is designated (SPAs/SACs) or notified (SSSIs).
High	Other species that contribute to the integrity of an SPA or SSSI. A local population of more than 1% of the national population of a species. Any ecologically sensitive species, e.g. large birds of prey or rare birds (<300 breeding pairs in the UK). EU Birds Directive Annex 1, EU Habitats Directive priority habitat/species and/or Wildlife and Countryside Act Schedule 1 species (if not covered above). Other specially protected species.
Medium	Regionally important population of a species, either because of population size or distributional context. UK Biodiversity Action Plan (BAP) priority species (if not covered above).
Low	Any other species of conservation interest, e.g. species listed on the Birds of Conservation Concern not covered above, present in only locally important numbers
Negligible	Green-listed species (Stanbury *et al*. 2021) of favourable conservation status.

Magnitude of Impact

8.4.30 An impact is defined as a change of particular magnitude to the abundance and/or distribution of a population as a result of the Proposed Development. **Table 8.3** shows the definitions of the impact magnitude classification used for the assessment.

Table 8.3: Definition of terms relating to the magnitude of ornithological impacts

Magnitude	Definition
Very High	Total loss or very major alteration to key elements/ features of the baseline conditions such that post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether. Guide: >80% of population/habitat lost
High	Major alteration to key elements/ features of the baseline conditions such that post development character/composition/attributes will be fundamentally changed. Guide: 20-80% of population/habitat lost
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/ composition/ attributes of baseline will be partially changed. Guide: 5-20% of population/habitat lost
Low	Minor shift away from baseline conditions. Change arising from the loss/ alteration will be discernible but underlying character/composition/ attributes of baseline condition will be similar to pre-development circumstances/patterns. Guide: 1-5% of population/habitat lost
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the "no change" situation. Guide: <1% of population/habitat lost

Significance Criteria

8.4.31 The combined assessment of the magnitude of an impact and the value of the receptor was used to determine the significance of potential effects. These two criteria were cross-tabulated to assess the overall effect and significance of that effect (**Table 8.4**). This gives a guide as to the determination of significance, though the final assessment was still subject to professional judgment. The significance category of each combination is shown in each cell. Shaded cells indicate potentially significant effects in terms of the EIA Regulations.

Table 8.4: Matrix of magnitude of impact and conservation value used to test the significance of effects

		CONSERVATION VALUE				
		Very high	High	Medium	Low	Negligible
MAGNITUDE	Very high	Major	Major	Major-moderate	Moderate	Negligible

	High	Major	Major	Moderate	Minor	Negligible
	Medium	Major	Major-moderate	Minor	Negligible	Negligible
	Low	Moderate	Minor	Minor	Negligible	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible

8.4.32 The interpretation of these significance categories was as follows:

- Negligible and minor are not normally of concern, though best practice (Scottish Renewables *et al*. 2019) will be exercised to minimise any adverse effects;
- Moderate represents a potentially significant adverse effect on which professional judgment has to be made, though for which it is likely that mitigation will reduce it below the significance threshold; and
- Major and major/moderate represent significant adverse effects on bird populations which are regarded as significant for the purposes of EIA.

8.4.33 The NatureScot (SNH 2018a) wider countryside assessment guidance defines the key significance test as follows: “An impact should be judged as of concern where it would adversely affect the favourable conservation status of a species or stop a recovering species from reaching favourable conservation status, at international or national level or regionally.” It notes that the key baseline population against which the assessment should be made for breeding birds is the SNH Natural Heritage Zone (NHZ) population (NHZ 14, ‘Argyll West and Islands’, in this case).

8.4.34 A cumulative ornithological assessment (using the same criteria as the main assessment) has been undertaken following the SNH 2018b guidance on 'Assessing the cumulative impacts of onshore wind farms on birds', considering impacts on the favourable conservation status of key species within the relevant NHZ, in this case NHZ 14 ‘Argyll West and Islands’.

8.4.35 As the 20 km study area held species specially protected under Schedule 1 of the 1981 Wildlife and Countryside Act, information on the breeding sites and associated flight activity of the species listed on that Schedule is provided in a Confidential Annex in **Technical Appendix 8.8**. It is important that their breeding locations are kept confidential to minimise

the risk of persecution and disturbance. Following NatureScot (SNH 2016b) guidance, the amount of information contained in that Technical Appendix has been kept to a minimum but includes all data that indicate breeding locations.

Limitations and Assumptions

8.4.36 No significant information gaps have been identified. Inevitably with any ornithological survey it cannot be guaranteed to detect all target species/individuals and surveys cannot be fully representative of all conditions (e.g. severely reduced visibility). However, in this case it was concluded that the baseline surveys provide a robust data set on which to carry out the assessment.

8.5 Baseline

Statutory Protected Sites

8.5.1 There are four statutory designated nature conservation sites of ornithological importance in the search area around the Proposed Development (5 km for nationally important SSSIs and 20 km for internationally important European Protected SPAs and Ramsar Sites). Their locations are shown in **Figure 7.1** (international designations within 20 km) and **Figure 7.2** (national designations within 5km). The qualifying/notified features of each is as follows:

- Kintyre Goose Roosts SPA/Ramsar/SSSI – 540 m north-east of the Proposed Development at its closest point - a series of hill lochs (Loch Garasdale, Loch an Fhraoich, Loch Lussa, Tangy Loch and Black Loch) and an area of grassland and heath at Rhunahaorine Point on the Kintyre peninsula. It has been designated for its internationally important wintering population of Greenland white-fronted goose (1991/92-95/96 winter peak mean of 2,300, 8% of Total world population; 16% of GB).
- Sound of Gigha SPA – 600 m west of the Proposed Development – designated for its wintering populations of great northern diver (2004/05-07/08 winter peak mean of 505, 20% of GB), Slavonian grebe (2008/09-12/13 winter peak mean of 37, 3.4% of GB), red-breasted merganser (2004/05-07/08 winter peak mean of 117, 2.4% of GB), and eider (2004/05-07/08 winter peak mean of 1,295, 2.2% of GB).

- Rhunahaorine Point SSSI – 1.7 km north-west of the Proposed Development - notified for its natural features of coastal shingle, overwintering Greenland white-fronted geese and breeding little tern (9-25 pairs, 2006-2009).
- Arran Moors SPA – 19 km south-east of the Proposed Development – designated for its breeding hen harrier population of European importance (21 breeding females between 1994 and 1998, 4% of GB). The site lies outside the connectivity distance from this SPA so would not affect it.

8.5.2 The following statutory designated nature conservation sites are located within the search area but have no ornithological interest features:

- Inner Hebrides and the Minches SAC – 5 km north – designated for its harbour porpoise population. Given its interest features and distance from the site would not be affected by the Proposed Development.
- Tarbert Woods SAC – 13 km north-east – designated for its western acidic oak woodland. Given its interest features and distance from the site would not be affected by the Proposed Development.

8.5.3 The potential connectivity of each of the SPA/Ramsar sites to the Proposed Development is summarised in **Table 8.5**. This lists the qualifying features for each SPA, the distance from the site at its closest point and an initial assessment of whether the site falls within the core range of each (as set out in SNH 2016a). As set out in this guidance, "*In most cases the core range should be used when determining whether there is connectivity between the proposal and the qualifying interests*", so this has been used for this assessment (though with consideration of the maximum ranges too).

Table 8.5: Special Protection Areas/Ramsar Sites within 20 km of the Proposed Development, their qualifying features and likely connectivity to the site.

SPA	Distance from site	Qualifying features	Qualifying features for which site lies within core range (SNH 2016a)
Kintyre Goose Roosts	0.5 km	Wintering Greenland white-fronted goose	Greenland white-fronted goose (5-8 km)

SPA	Distance from site	Qualifying features	Qualifying features for which site lies within core range (SNH 2016a)
Sound of Gigha	0.6 km	Wintering great northern diver, Slavonian grebe, red-breasted merganser and eider	None
Arran Moors	19 km	Breeding hen harrier	None (hen harrier core range is 2 km, max. 10 km)

Current Baseline

Field Survey Results: Breeding Birds

8.5.4 The breeding bird populations found within the core survey area during each of the breeding bird surveys are summarised in **Table 8.6**. This Table shows the estimated number of breeding pairs recorded during each of the two survey years (2022 and 2023). Details of all the breeding bird populations are set out in **Technical Appendices 8.1 and 8.2**.

Table 8.6: Breeding Bird Populations in the Core Survey Area (April-August 2022 and 2023)

Species	Number of pairs in 2022	Number of pairs in 2023
Canada Goose	2	1
Teal	2	4
Mallard	4	5
Goldeneye	1	0
Red Grouse	5	6
Black Grouse	5	4
Pheasant	0	1
Red-throated Diver	1	1
Little Grebe	1	1
Buzzard	4	2
Kestrel	1	0

Species	Number of pairs in 2022	Number of pairs in 2023
Snipe	6	4
Common Sandpiper	1	0
Common Gull	2	2
Woodpigeon	7	9
Collared Dove	1	0
Cuckoo	7	12
Skylark	116	94
Sand Martin	0	3
Swallow	3	0
Tree Pipit	4	16
Meadow Pipit	734	733
Grey Wagtail	9	4
Pied Wagtail	9	3
Wren	132	137
Dunnock	23	22
Robin	67	91
Redstart	0	1
Whinchat	17	16
Stonechat	22	45
Wheatear	2	0
Blackbird	15	19
Song Thrush	17	18
Mistle Thrush	9	3
Grasshopper Warbler	5	3
Sedge Warbler	2	2
Blackcap	1	0
Whitethroat	6	4
Chiffchaff	0	2
Willow Warbler	144	176
Goldcrest	53	52

Species	Number of pairs in 2022	Number of pairs in 2023
Blue Tit	0	1
Great Tit	5	2
Coal Tit	46	58
Treecreeper	0	4
Jay	7	7
Jackdaw	0	1
Carrion Crow	2	1
Hooded Crow	10	10
Raven	2	4
Chaffinch	130	112
Goldfinch	2	11
Siskin	28	39
Linnet	4	4
Lesser Redpoll	43	47
Common Crossbill	5	6
Bullfinch	7	13
Reed Bunting	17	14

Note: The brackets in the Table indicate numbers breeding in the wider study area (500 m-2 km from the development).

Species-Specific Breeding Bird Survey Results

Black Grouse

8.5.5 Four black grouse lekking areas were located during the surveys, two of which held up to 2 lekking males. All four were used in 2022 but only two in 2023. The others were just single lekking males. Their locations (and additional records of this species are shown in **Figure 8.2**. The survey area population was estimated at five lekking males in 2022 and four in 2023.

Red-throated Diver

8.5.6 One pair of red-throated divers was recorded nesting within the survey area in each baseline year, though on different lochs, both to the east of the Proposed Development. They successfully fledged a chick in 2023 but failed in 2022. Their locations and associated flight lines (which show the nesting lochs) are given in the **Confidential Technical Appendix 8.8**.

Hen Harrier

8.5.7 There were regular flights over the site during the VP surveys, but no notable concentrations of flight activity and no evidence of breeding within 2 km of any proposed wind turbines in 2022 or 2023. Details of two active nests located more than 2 km from the site are given in the **Confidential Technical Appendix 8.8**.

Golden Eagle

8.5.8 A pair was active within the territory in which the site is located in 2022 and 2023, (including using a previous nest location for roosting). No evidence was found of any egg-laying, or, in 2023, any definitive nest-building. There had been initial signs of breeding in February 2022, with stick-carrying/nest building observed near a previously-used nest site. In both 2022 and 2023 this pair were regularly observed to the north of the site during the wider area surveys, but no nest was located there either. They were also seen regularly over-flying the forest where the Proposed Development would be located. A second pair was recorded to the south-east of the site seen during the wider area surveys. The Argyll Raptor Study Group confirmed that they bred at a well-established eyrie south-east from the Proposed Development. Details of the golden eagle nest sites are given in the **Confidential Technical Appendix 8.8**.

White-tailed Eagle

8.5.9 There were 12 records of this species over-flying during summer 2022 and seven in 2023, but no evidence of breeding within 2 km of the Proposed Development. Their flight lines are shown in **Figure 8.3**.

Osprey

8.5.10 Three osprey flights were observed during the 2022 VP surveys and five in 2023, but there was no evidence of breeding within the survey area. Their flight lines are shown in **Figure 8.4**.

Merlin

8.5.11 There was a single record of a female overflying the site in 2022 during the VP surveys, and a wider survey area record of a single bird seen flying over potentially suitable breeding habitat 3 km south-east of the site. There were no records of this species during the 2023 surveys. Their flight lines are shown in **Figure 8.4**.

Peregrine

8.5.12 There were three records of this species overflying during the 2022 VP surveys (an adult male and two records of a juvenile) and one in 2023, but no evidence of breeding within the core or the wider survey area. Their flight lines are shown in **Figure 8.4**.

Barn Owl

8.5.13 An active nest with small chicks was located to the north of the site in June 2023, over 1km from the nearest current proposed turbine location. Further details are given in the **Confidential Appendix 8.8**.

Vantage Point Survey Results: Breeding Season

8.5.14 The rates of bird flight movement observed across the site during the breeding season VP surveys are summarised in **Table 8.7**. This gives the flight rate per hour of observation in each year and the overall mean flight rate per hour. Overall flight rates of key species over the site were low, with no major differences apparent between years.

8.5.15 **Table 8.7** also gives the percentage of flights of each species that were recorded at rotor height (25-180 m above ground level) over both years' baseline data.

Table 8.7: Key Species Flight Rates recorded over the VP survey area during the 2022 and 2023 breeding season vantage point surveys

Species	Flight rate in 2022 (birds/hour)	Flight rate in 2023 (birds/hour)	Total number observed	% flights at rotor height (25-180m)
Pink-footed Goose	0.38	0	22	0%
White-fronted Goose	0.53	0	31	100%
Canada Goose	0	0.07	4	50%
Mallard	0	0.12	7	43%
Red Grouse	02	0	1	0%

Species	Flight rate in 2022 (birds/hour)	Flight rate in 2023 (birds/hour)	Total number observed	% flights at rotor height (25-180m)
Red-throated Diver	0.97	0.50	85	85%
White-tailed Eagle	0.21	0.07	16	63%
Hen Harrier	0.26	0.78	60	42%
Sparrowhawk	0.38	0.22	35	60%
Buzzard	2.07	1.67	217	68%
Golden Eagle	0.84	0.67	88	82%
Osprey	0.05	0.09	8	70%
Kestrel	0.45	0.55	58	36%
Merlin	0.02	0	1	100%
Peregrine	0.05	0.02	4	100%
Golden Plover	0.17	0.09	15	90%
Snipe	0.16	0.05	12	67%
Common Gull	0.33	0.28	35	19%
Lesser Black-backed Gull	0	0.02	1	100%
Herring Gull	0.02	0.03	3	100%
Great Black-backed Gull	0.07	0.02	5	100%
Black-headed Gull	0.02	0	1	100%
Common Crossbill	0.19	0	11	64%

Field Survey Results: Wintering Birds Site Walkover

8.5.16 The results of the autumn/winter walkover surveys are summarised in **Table 8.8**. The Table shows the mean and peak counts recorded in each of the two survey years (2021-22 and 2022-23).

Table 8.8: Autumn/Winter Bird Populations (wintering bird walkover survey area during 2021-22 and 2022-23)

Species	Mean count 2021-22	Mean count 2022-23	Peak count 2021-22	Peak count 2022-23
Whooper Swan	0.9	0	4	0
Pink-footed Goose	0.1	0	1	0
White-fronted Goose	0.3	0	2	0
Greylag Goose	0	0.1	0	1
Teal	6.7	21.3	22	126
Mallard	1.3	0.3	4	2
Tufted Duck	0.3	0	1	0
Goldeneye	1.7	0.7	3	3
Red Grouse	6.4	3.0	18	5
Black Grouse	0.4	1.7	2	6
Little Grebe	0.1	0	1	0
Grey Heron	0.1	0	1	0
Red Kite	0	0.1	0	1
White-tailed Eagle	0	0.9	0	6
Marsh Harrier	0	0.1	0	1
Hen Harrier	0.1	1.1	1	2
Sparrowhawk	0.1	0.6	1	2
Buzzard	1.4	2.3	5	5
Golden Eagle	0.1	1.6	1	4
Kestrel	0	1.4	0	2
Golden Plover	14.7	9.3	55	29
Snipe	4.0	1.0	7	3
Woodcock	0.9	0.4	2	1
Tawny Owl	0.1	0.6	1	2
Common Crossbill	0.3	12.9	2	28
Snow Bunting	0	0.1	0	1

Field Survey Results: Wintering Birds Wider Waterfowl Survey

8.5.17 The results of the autumn/winter waterfowl surveys are summarised in **Table 8.9**. The Table shows the mean and peak counts recorded in each of the two survey years (2021-22 and 2022-23). Greenland white-fronted geese were the most abundant target species and were seen frequently during the surveys (peak count 575 in 2021-22 and 477 in 2022-23).

Table 8.9 Autumn/Winter Bird Populations (wintering waterfowl survey area during 2021-22 and 2022-23)

Species	Mean count 2021-22	Mean count 2022-23	Peak count 2021-22	Peak count 2022-23
Mute Swan	0.6	0.9	3	4
Whooper Swan	1.3	1.1	13	8
Pink-footed Goose	0	0.2	0	1
Greenland White-fronted Goose	379.1	328.4	575	477
European White-fronted Goose	0	0.1	0	1
Greylag Goose	136.1	120.7	368	298
Canada Goose	15.4	16.7	66	53
Barnacle Goose	1.5	0.8	5	7
Shelduck	0.1	0.1	1	1
Wigeon	1.8	4.2	14	32
Teal	9.5	4.2	104	25
Mallard	12.7	6.5	53	20
Grey Heron	0.2	0.6	1	3
White-tailed Eagle	0	0.2	0	1
Hen Harrier	0.1	0.2	1	1
Sparrowhawk	0.2	0.2	1	1
Buzzard	3.1	3.1	10	7
Golden Eagle	0	0.1	0	1
Kestrel	0	0.1	0	1
Peregrine	0.1	0.1	1	1
Oystercatcher	5.7	8.8	35	29
Lapwing	51.6	48.4	102	143

Species	Mean count 2021-22	Mean count 2022-23	Peak count 2021-22	Peak count 2022-23
Snipe	0.5	0.5	6	5
Woodcock	0.3	0.1	2	1
Curlew	32.8	20.2	90	115
Redshank	0	0.1	0	1
Mediterranean Gull	0	0.1	0	1
Common Gull	100.7	141.6	257	342
Herring Gull	234.2	230.7	799	485
Great Black-backed Gull	0.9	1.8	6	6
Black-headed Gull	24.8	37.5	169	111
Herring Gull	234.2	230.7	799	485
Great Black-backed Gull	0.9	1.8	6	6
Black-headed Gull	24.8	37.5	169	111

Vantage Point Survey Results: Winter

8.5.18 The rates of bird flight movement observed across the site during the autumn/winter VP surveys are summarised in **Table 8.10**. This shows a comparison of the flight rates recorded in each of the two autumn/winters (2021-22 and 2022-23).

8.5.19 **Table 8.10** also gives the overall percentage of flights of each species that were recorded at rotor height (between 25 m and 180 m above ground level).

Table 8.10: Key Species Flight Rates recorded over the VP survey area during the 2021-22 and 2023-23 autumn/winter vantage point surveys

Species	Flight rate in 2021-22 (birds/hour)	Flight rate in 2022-23 (birds/hour)	Total number observed over-flying	% flights at rotor height (25-180m)
Whooper Swan	0.17	0.13	38	42%

Species	Flight rate in 2021-22 (birds/hour)	Flight rate in 2022-23 (birds/hour)	Total number observed over-flying	% flights at rotor height (25-180m)
Pink-footed Goose	0.20	5.21	352	25%
White-fronted Goose	8.17	4.00	1541	87%
Greylag Goose	0.08	0.06	17	100%
Canada Goose	0.10	0	13	0%
Teal	0.05	0.14	24	0%
Red Grouse	0.02	0.15	21	0%
Black Grouse	0	0.08	11	40%
Grey Heron	0	0.02	2	50%
Red Kite	0	0.08	10	100%
White-tailed Eagle	0.05	0.07	15	94%
Hen Harrier	0.09	0.28	38	30%
Sparrowhawk	0.06	0.07	14	34%
Buzzard	0.36	0.41	94	52%
Golden Eagle	0.22	0.47	82	88%
Kestrel	0.06	0.18	29	12%
Merlin	0.01	0.02	3	25%
Golden Plover	1.60	4.00	735	80%
Snipe	0.01	0.06	9	30%
Woodcock	0.07	0.05	16	0%
Common Gull	0.01	0	1	100%
Great Black-backed Gull	0	0.02	2	50%
Tawny Owl	0	0.01	1	0%
Long-eared Owl	0.01	0.02	4	0%
Common Crossbill	**0**	**0.63**	**79**	**75%**

Future Baseline

8.5.20 In the "do nothing" scenario without the construction of the Proposed Development, it is anticipated that the current management of the site will continue as part of wider estate management activities and that the bird populations currently present will continue at the site, though subject to changes occurring at the national and regional levels, such as the national decline in black grouse population (Pearce-Higgins *et al*. 2015). Local future trends in numbers will be dependent primarily on habitat change. Further afforestation could reduce open ground species, such as the breeding waders, but temporarily improve conditions for black grouse and hen harrier. The main current land use within the site (sheep and deer grazing), would likely continue into the future. Changes are also likely to occur as a result of climate change, though would be anticipated to be minor over the lifetime of the Proposed Development.

Ornithological Conservation Evaluation

Conservation Evaluation of Breeding Bird Populations

8.5.21 The conservation value of the breeding bird populations was determined using the criteria specified in **Table 8.2**. The results are summarised in **Table 8.11**. All of the species with very high - low value have been taken forward in the ornithological assessment (i.e. only those with Negligible value have been scoped out at this stage).

Table 8.11: Conservation Evaluation of the Breeding Bird Populations at the Site (2022 and 2023)

Species	Peak breeding pairs 2022/23	>1% NHZ	EU Birds Dir Ann 1	Wildlife and Countryside Act Sch 1	Red [R]/ Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Breeding Species:								
Canada Goose	2							Negligible
Teal [3]	4				A			Low
Mallard	5				A			Low

Species	Peak breeding pairs 2022/23	>1% NHZ	EU Birds Dir Ann 1	Wildlife and Countryside Act Sch 1	Red [R] / Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Goldeneye [4]	1			✓	R			High
Red Grouse [1]	6					✓		Medium
Black Grouse [3]	5				R	✓	✓	Medium
Pheasant	1							Negligible
Red-throated Diver [3]	1		✓	✓			✓	High
Little Grebe [3]	1							Negligible
Buzzard [2]	4							Negligible
Kestrel	1				A		✓	Low
Snipe [2]	6				A			Low
Common Sandpiper [2]	1				A			Low
Common Gull [2]	2				A			Low
Woodpigeon	9				A			Low
Collared Dove	1							Negligible
Cuckoo [2.5]	7				R	✓	✓	Medium
Skylark	116				R	✓	✓	Medium
Sand Martin	3							Negligible
Swallow	3							Negligible
Tree Pipit	16				R	✓	✓	Medium
Meadow Pipit	734				A			Low
Grey Wagtail [2]	9				A			Low
Pied Wagtail	9							Negligible
Wren	137				A			Low
Dunnock	23				A	✓		Medium

Species	Peak breeding pairs 2022/23	>1% NHZ	EU Birds Dir Ann 1	Wildlife and Countryside Act Sch 1	Red [R] / Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Robin	91							Negligible
Redstart	1							Negligible
Whinchat [2]	17				R			Low
Stonechat [2]	45							Negligible
Wheatear [1]	2				A			Low
Blackbird	19							Negligible
Song Thrush	18				A	✓	✓	Medium
Mistle Thrush	9				R			Low
Grasshopper Warbler	5				R	✓	✓	Medium
Sedge Warbler	2				A			Low
Blackcap	1							Negligible
Whitethroat	6							Negligible
Chiffchaff	2							Negligible
Willow Warbler	176				A			Low
Goldcrest	53							Negligible
Blue Tit	1							Negligible
Great Tit	5							Negligible
Coal Tit	58							Negligible
Treecreeper	4							Negligible
Jay	7							Negligible
Jackdaw	1							Negligible
Carrion Crow	2							Negligible
Hooded Crow	10						✓	Low
Raven [3]	4							Negligible
Chaffinch	130							Negligible
Goldfinch	11							Negligible

Species	Peak breeding pairs 2022/23	>1% NHZ	EU Birds Dir Ann 1	Wildlife and Countryside Act Sch 1	Red [R] / Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Siskin	39						✓	Low
Linnet	4				R	✓	✓	Medium
Lesser Redpoll	47					✓	✓	Medium
Common Crossbill	6			✓				High
Bullfinch	13				A	✓	✓	Medium
Reed Bunting	17				A	✓	✓	Medium
Additional non-breeding species:	Peak count							
Pink-footed Goose	22				A			Low
White-fronted Goose	31				R		✓	Very high
Goosander	2					✓		Negligible
Grey Heron	1							Negligible
White-tailed Eagle	2		✓	✓	A		✓	High
Hen Harrier	2		✓	✓	R		✓	High
Golden Eagle	2		✓	✓			✓	High
Osprey	1		✓	✓	A		✓	High
Merlin	1		✓	✓	R		✓	High
Peregrine	2		✓	✓			✓	High
Golden Plover	185		✓					High
Herring Gull	1				R	✓	✓	Medium
Great Black-backed Gull	1				A			Low

Species	Peak breeding pairs 2022/23	>1% NHZ	EU Birds Dir Ann 1	Wildlife and Countryside Act Sch 1	Red [R]/ Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Black-headed Gull	1				A			Low
Fieldfare	1				R			Low

Note: The brackets in the Table indicate numbers breeding in the wider study area (500 m-2 km from the development). Superscript numbers give the score for each species' contribution to the breeding bird community score (Drewitt *et al*. 2020).

8.5.22 Three high value species were recorded breeding within the core breeding bird survey area during 2022 and 2023, goldeneye, red-throated diver and common crossbill. All are specially protected under Schedule 1 of the Wildlife and Countryside Act, and red-throated diver is additionally listed on Annex 1 of the EU Birds Directive.

8.5.23 Twelve breeding species were classed as medium conservation value: red grouse, black grouse, cuckoo, skylark, tree pipit, dunnock, song thrush, grasshopper warbler, linnet, lesser redpoll, bullfinch and reed bunting. All were classed as medium value because of their listing on the UK Biodiversity Action Plan list of priority species.

8.5.24 A further 18 breeding species were classed as low sensitivity, through their listing on RSPB et al.'s (Stanbury *et al*. 2021) amber lists of birds of conservation concern and/or the Scottish Biodiversity List.

8.5.25 The overall conservation value of the breeding bird community in 2022 and 2023, measured from the core survey data as the breeding bird assemblage score, was 37.5. This just below the threshold for national importance (40) for the main habitat within the survey area, 'Upland moorland and grassland with water bodies' (Drewitt *et al*. 2020). The core breeding bird survey area, therefore, supports a regionally important breeding bird community.

8.5.26 The evaluation of the conservation importance of the non-breeding species observed during these surveys is given in **Table 8.11**. This included one very high value species (Greenland white-fronted goose, linked to the Kintyre Goose Roosts SPA), seven high value species (white-tailed eagle, hen harrier, golden eagle, osprey, merlin, peregrine and golden plover), all EU Annex 1/Wildlife and Countryside Act Schedule 1 species), one

medium value (herring gull, a UK BAP priority species), present in regionally important numbers), and four additional low value species (through their red/amber listing). All these species were seen only infrequently in generally low numbers during the breeding bird surveys.

Conservation Evaluation of Wintering Bird Populations

8.5.27 The conservation value of the wintering bird populations was determined using the criteria specified in **Table 8.2**. The results are summarised in **Table 8.12**. This included one very high sensitivity species (Greenland white-fronted goose – the birds seen are ecologically linked to the Kintyre Goose Roosts SPA), 11 high sensitivity species (whooper swan, barnacle goose, goldeneye, little egret, white-tailed eagle, hen harrier, golden eagle, red kite, peregrine, merlin and golden plover) that are EU Birds Directive Annex 1/Wildlife and Countryside Act Schedule 1 species, 10 medium sensitivity species (UK BAP priority/ red listed species of conservation concern and/or species present in regionally important numbers; greylag goose, European white-fronted goose, teal, mallard, red grouse, black grouse, lapwing, curlew, herring gull and long-eared owl), and 13 low sensitivity species.

8.5.28 All of the species with very high - low value have been taken forward in the ornithological assessment (i.e. only those with Negligible value have been scoped out at this stage).

Table 8.12: Conservation Evaluation of the Wintering Bird Populations at the Site (2021-22 and 2022-23)

Species	Peak ground count (core)	Peak ground count (wider)	>1% NHZ	EU Birds Dir Ann 1	Wildlife and Countryside Act Sch 1	Red [R]/ Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Mute Swan	0	4							Negligible
Whooper Swan	7	13	✓	✓	✓	A		✓	High

Species	Peak ground count (core)	Peak ground count (wider)	>1% NHZ	EU Birds Dir Ann 1	Wildlife and Countryside Act Sch 1	Red [R]/ Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Pink-footed Goose	328	1				A			Low
Greenland White-fronted Goose	155	575	✓			R	✓	✓	Very high
European White-fronted Goose	0	1	✓			R	✓	✓	Medium
Greylag Goose	0	368	✓			A			Medium
Canada Goose	0	66							Negligible
Barnacle Goose	0	7		✓		A		✓	High
Shelduck	0	1				A			Low
Wigeon	0	32				A			Low
Teal	22	104	✓			A			Medium
Mallard	4	53	✓			A			Medium
Tufted Duck	1	0							Negligible
Goldeneye	3	0			✓	R			High
Red Grouse	18	0					✓		Medium
Black Grouse	6	0	✓			R	✓	✓	Medium
Little Grebe	1	0							Negligible
Little Egret	0	1		✓					High
Grey Heron	1	3							Negligible
Red Kite	1	0	✓	✓	✓			✓	High
White-tailed Eagle	1	1	✓	✓	✓	A		✓	High
Marsh Harrier	1	0	✓	✓	✓	A		✓	High
Hen Harrier	1	1	✓	✓	✓	R		✓	High
Sparrowhawk	1	1				A			Low

Species	Peak ground count (core)	Peak ground count (wider)	>1% NHZ	EU Birds Dir Ann 1	Wildlife and Countryside Act Sch 1	Red [R]/ Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Buzzard	5	10							Negligible
Golden Eagle	2	1	✓	✓	✓			✓	High
Kestrel	1	1				A		✓	Low
Merlin	1	0	✓	✓	✓	R		✓	High
Peregrine	0	1	✓	✓	✓			✓	High
Oystercatcher	0	35				A			Low
Golden Plover	55	5		✓				✓	High
Lapwing	0	143				R	✓	✓	Medium
Snipe	7	6				A			Low
Woodcock	2	2				R		✓	Low
Curlew	0	115				R	✓	✓	Medium
Mediterranean Gull	0	1	✓	✓	✓				High
Common Gull	0	342				A			Low
Lesser Black-backed Gull	0	1				A			Low
Herring Gull	0	799	✓			R	✓	✓	Medium
Great Black-backed Gull	0	6				A			Low
Black-headed Gull	0	169				A			Low
Tawny Owl	1	0				A			Low
Long-eared Owl	1	0	✓						Medium
Common Crossbill	28	0			✓				High
Snow Bunting	1	0			✓	A		✓	High

8.5.29 The key autumn/wintering bird populations recorded were as follows:

- Greenland white-fronted goose – daytime feeding flocks were widely distributed across the wider waterfowl survey area, though with fewer records in the southern part (including the fields closer to the Proposed Development site). Their flight lines were mostly over the northern part of the Proposed Development site. They roosted at night occasionally on the small lochs in the north-eastern part of the core survey area: Loch Luireach – 85 on 9/11/21, 92 on 25/1/23, Loch Fionn-Ghleann - 120 on 11/11/21, 64 on 7/3/23, Loch a‘ Ghlinn Bhig – 70 on 8/2/92, 155 on 14/2/23. Additionally, 75 were seen flying in to Loch Ulagadale on 9/11/21.
- Whooper Swan – three flights were recorded over the site during the 2022-23 VP surveys, including a flock of seven that flew in to land on Loch a‘ Ghlinn Bhig on 8/11/22. Seven further flocks of up to 12 birds were seen over-flying during the wider surveys.
- Barnacle Goose – none were recorded on/over the site or in the wider survey area in 2022-23, but a small flock of up to five birds was seen in the previous winter (mixed with Greenland white-fronted geese in the wider survey area).
- Goldeneye – this species was seen occasionally on Loch na Naich within the site in small numbers (up to two birds), with one additional record of a bird on Loch a‘ Ghlinn Bhig.
- Other wintering wildfowl – greylag geese, teal and mallard were all recorded in the wider waterfowl survey area in regionally important numbers, but the Proposed Development site itself was not important for any of them, with only occasional flights recorded. Greylag geese had a similar pattern to the Greenland white-fronted geese. Small numbers of migrant pink-footed geese were also recorded over-flying during the VP surveys.
- Red and Black Grouse – red grouse were scattered widely at low density over the open moorland mainly in the higher eastern part of the survey area. Black grouse were frequently seen in the central and western parts of the survey area.
- Hen harrier – this species was regularly seen hunting over the site through the winter, with 11 flights in 2021-22 and 27 flights in 2022-23. No evidence was found, though, of any night roosts in the survey area, and most flights seen were below rotor height. There were not any notable concentrations of flight activity in any particular part of

the survey area, though most were seen in the central and western part of the survey area, with few in the eastern part.

- Golden Eagle – this species was observed regularly over-flying the site during the VP surveys, with 26 records in 2021-22 and 56 in 2022-23. Most flights were recorded in the central and western parts of the site, mostly over the forestry. There were few flights over the flatter open moorland in the eastern part of the site.
- Other scarce raptors and owls – white-tailed eagle, red kite, marsh harrier, merlin and long-eared owl were all recorded during the winter surveys, but only infrequently in low numbers. There was no indication that the survey area was important to any of these species at this time of year.
- Golden Plover – small numbers (peak 55 in 2021-22 and 29 in 2022-23) of golden plover were seen regularly through the winter using the site during the walkover and VP surveys. Most birds in both winters were seen on the flatter open moorland in the eastern part of the survey area.

8.6 Assessment of Potential Effects

8.6.1 The key issues for the assessment of potential ornithological effects relating to the Proposed Development are identified below (SNH 2018a):

- Direct loss of bird habitat through construction of the Proposed Development;
- Disturbance of birds during construction and operation; and
- Collision risk to birds during operation.

8.6.2 The potential disturbance zones of the Proposed Development were defined for the assessment as follows (Percival 2005, Drewitt and Langston 2006):

- **Potential construction disturbance zone** – 500 m buffer around the proposed wind turbine locations plus their associated infrastructure and site tracks;
- **Potential operational disturbance zone** – 500 m buffer around the proposed wind turbine locations

8.6.3 It should be noted that only partial displacement within these zones might be expected (Pearce-Higgins *et al*. 2009), but it was assumed for the purposes of this assessment that all birds occurring within the zone are at

risk of disturbance. For NS priority species (SNH 2018a) consideration was also given to the disturbance distances given in Goodship and Furness (2022).

8.6.4 No ornithological issues were scoped out from this assessment, though, following NS (SNH 2018a) guidance, the assessment has focussed on the key species likely to be affected by the Proposed Development. Key species were defined using the following criteria:

- species listed on Annex 1 of the EU Birds Directive;
- species listed on Schedule 1 of the 1981 Wildlife & Countryside Act;
- species with potential ecological connectivity with statutory protected sites;
- species identified by SNH 2018a as 'Priority bird species for assessment when considering the development of onshore wind farms in Scotland'. These include (a) species that are widespread across Scotland which utilise habitats or have flight behaviours that may be adversely affected by a wind farm, and (b) as 'restricted range' species; and
- red-listed species on the Birds of Conservation Concern list.

8.6.5 The assessment also considers and applies the tests given in NS guidance on the assessment of the effects of wind farms in the wider countryside (SNH 2018a). This guidance lists a range of priority 'species potentially at risk of impact', of which the following were recorded during the baseline surveys: whooper swan, barnacle goose, pink-footed goose, Greenland white-fronted goose, greylag goose, black grouse, red-throated diver, white-tailed eagle, marsh harrier, hen harrier, golden eagle, red kite, osprey, merlin, peregrine, golden plover, lapwing, curlew and herring gull. The potential effects of the Proposed Development on each of these have been specifically considered and assessed below.

NatureScot Key Species Potentially at Risk

8.6.6 NatureScot (SNH 2018a) has identified a range of key species as being at potential risk of impact from wind farms. These species form the key focus of the ornithological impact assessment in the following section. Only one such species potentially at risk of impact was found breeding within the potential construction and operational disturbance zones (see **Figure 8.2**):

- Black grouse (up to two pairs).

8.6.7 Additional key species recorded breeding outside this zone but within 2 km of the Proposed Development included red-throated diver.

8.6.8 Other key species recorded during the breeding season surveys but without any evidence of breeding within 2 km of the Proposed Development included pink-footed goose, Greenland white-fronted goose, white-tailed eagle, hen harrier, golden eagle, osprey, merlin, peregrine and herring gull.

8.6.9 Key species recorded using the potential construction and operational disturbance zones outside the breeding season included whooper swan, Greenland white-fronted goose, greylag goose, barnacle goose, black grouse, golden eagle, white-tailed eagle, red kite, marsh harrier, hen harrier, golden plover, lapwing, curlew, herring gull, peregrine and merlin.

8.6.10 Key species recorded at risk of collision (i.e. flying through the proposed farm at rotor height) included whooper swan, Greenland white-fronted goose, greylag goose, red-throated diver, black grouse, golden eagle, white-tailed eagle, red kite, osprey, hen harrier, golden plover, herring gull, peregrine and merlin.

Embedded Mitigation

8.6.11 The design measures implemented to reduce the ornithological effects of the Proposed Development were as follows:

- The two northernmost turbines were removed from the scoping layout in response to geese flight lines mapped during vantage point ornithology surveys to avoid the main Greenland white-fronted goose flight corridor and hence reduce potential collision risk to the geese.
- Turbines and associated infrastructure were all located >1 km from the Kintyre Goose Roosts SPA, and >800 m from any other goose roost lochs.
- Turbines were located within, or in close proximity to, conifer plantations to reduce effects on moorland birds, including golden eagle and hen harrier.
- Turbines were not located within 500 m of any regularly-used black grouse leks.

Construction Effects

Direct Effects: Loss of Habitat (Direct loss or degradation of habitat through construction of the Proposed Development)

Nature of Impact

8.6.12 There will be a direct loss of habitat resulting from the construction of the Proposed Development. As set out further in **Chapter 7**, the main habitats within the study area are coniferous plantation (and clear fell), blanket bog, marshy grassland (rush pasture, wet heath and dry heath. **Tables 7.9** and **7.10** set out the losses of each habitat that would occur as a result of the Proposed Development.

8.6.13 The direct loss of habitat for all bird species associated with the construction of the Proposed Development would be an effect of low/negligible magnitude. The permanent land take would be limited to the wind turbine and associated foundations, access tracks, permanent crane hardstands and substation hardstands, and associated forest felling, which account collectively for about 1.2% of the total area within the site. Additional temporary land take during construction would add further temporary habitat loss of about another 1.4% of the site area.

8.6.14 The use of existing tracks and the careful selection of routes for the access tracks and wind turbine locations, alongside the use of proven construction techniques, would ensure that such effects on birds would be of negligible magnitude (even in a local context). In addition, the applicant has committed to the production and implementation of a Construction Environmental Management Plan (CEMP) to the satisfaction of NatureScot and other relevant stakeholders before construction commences and would follow Windfarm Good Construction Guidance by Scottish Renewables *et al*. (2019).

Ornithological Receptor Value

8.6.15 Direct habitat loss will reduce habitat availability to the species breeding and foraging on the site, including one high value breeding key species (common crossbill), and one medium value (black grouse), and six high value species recorded foraging (golden eagle, white-tailed eagle, red kite, hen harrier, peregrine and merlin).

8.6.16 There will additionally be direct loss of Greenland white-fronted goose feeding habitat from the construction of wind farm access track at the site entrance. There would be a very small loss of agricultural grassland (approximately 0.2 ha.) for the access track turning circle to accommodate long loads.

Magnitude of Impact

8.6.17 This very small loss of breeding and foraging habitat will be of negligible magnitude for all of the bird species affected.

Significance of Effects

8.6.18 Ornithological effects of the direct habitat loss resulting from the construction of the Proposed Development would be of negligible magnitude and not significant.

Indirect Effects: Construction Disturbance (Noise and Visual)

8.6.19 Experience from existing UK wind farms has shown that many species are tolerant of the presence of operational wind turbines and not unduly disturbed by them. Some short-term displacement during wind farm operation of species such as curlew may occur following construction, but populations have subsequently re-established themselves (Bullen Consultants 2002). Most species that have been studied have not been significantly affected (Phillips 1994, Thomas 1999, Gill 2004, Devereux *et al*. 2008, Percival and Percival 2011, Douglas *et al*. 2011). An RSPB study (Pearce-Higgins *et al*. 2009) reported partial displacement of breeding upland birds around wind turbines for a distance up to 800 m; reported significant reductions in golden plover density up to 400 m from wind turbines. The scale and pattern of displacement is similar to that reported for breeding waders in general (Hotker *et al*. 2006), with most studies reporting only small scale (0-200 m) displacement distances and a smaller number over a greater distance.

8.6.20 The indirect effect of disturbance is likely to be highest during construction owing to the increased activity on site. Pearce-Higgins *et al*. (2012) found that red grouse, snipe and curlew densities all declined at wind farm sites during construction, whilst densities of skylark and stonechat increased. Construction also involves the presence of work personnel on-site, which itself can be an important source of potential disturbance. Pearce-Higgins *et al*. reported decreases in curlew density during construction of 40% and snipe by 53%. Other species, such as golden plover, though have been shown to be unaffected by construction disturbance (Sansom *et al*. 2016).

8.6.21 The assessment of construction disturbance has assumed that all birds within 500 m of the Proposed Development (the wind turbines plus their

associated infrastructure and site tracks) could potentially be at risk of displacement (Percival 2005, Drewitt and Langston 2006), though only partial displacement within these zones might be expected (Pearce-Higgins *et al.* 2009).

Nature of Impact

8.6.22 The estimated on-site construction period for the Proposed Development is expected to last approximately 15 months. The construction works will occur throughout the year, including the summer months when the weather is more favourable and ground conditions are drier.

8.6.23 Noise and visual disturbance associated with construction activities could potentially affect breeding and foraging birds in the locality of the wind turbine positions, access tracks and other infrastructure components. Birds that are disturbed at breeding sites are vulnerable to a variety of potential effects that could reduce the productivity or survival of their populations; these include the chilling or predation of exposed eggs and chicks and damage of eggs and chicks due to panicked adults. Birds subject to disturbance outside the breeding season may also feed less efficiently or resort to less favoured roosting areas, either of which may reduce their survival prospects. The potential impact will vary between species according to each species' tolerance of disturbance from human activity and the availability of suitable alternative breeding and foraging habitat.

Ornithological Receptor Value

8.6.24 **Table 8.13** shows the peak breeding bird populations of conservation importance that were found within 500 m of the proposed wind turbine locations and with the other associated infrastructure (including access tracks) during the baseline surveys, where this distance has been used to define the potential construction disturbance zone (though also giving consideration to particularly sensitive species in a wider area around that).

Table 8.13. Conservation Importance of Breeding Birds in the Wind Farm Potential Disturbance Zone

Species	Peak breeding pairs <500m from wind turbines	Peak breeding pairs <500m from all infrastructure	Scale of Importance of Breeding Population Within Potential Disturbance Zone	Conservation Value Within Potential Disturbance Zone
Canada Goose	0	1	Local	Negligible
Teal	0	1	Local	Low
Red Grouse	1	2	Local	Medium
BLACK GROUSE	**1**	**2**	**LOCAL**	**MEDIUM**
Pheasant	0	1	Local	Negligible
Little Grebe	0	1	Local	Negligible
Buzzard	1	1	Local	Negligible
Woodpigeon	7	9	Local	Low
Cuckoo	7	10	Local	Medium
Skylark	25	40	Local	Medium
Tree Pipit	14	16	Local	Medium
Meadow Pipit	245	403	Local	Low
Grey Wagtail	4	4	Local	Low
Pied Wagtail	3	3	Local	Negligible
Wren	100	118	Local	Low
Dunnock	15	19	Local	Medium
Robin	66	74	Local	Negligible
Redstart	0	1	Local	Negligible
Whinchat	3	12	Local	Low
Stonechat	23	31	Local	Negligible
Blackbird	13	17	Local	Negligible
Song Thrush	11	16	Local	Medium
Mistle Thrush	1	1	Local	Low

Species	Peak breeding pairs <500m from wind turbines	Peak breeding pairs <500m from all infrastructure	Scale of Importance of Breeding Population Within Potential Disturbance Zone	Conservation Value Within Potential Disturbance Zone
Grasshopper Warbler	2	2	Local	Medium
Sedge Warbler	0	2	Local	Low
Whitethroat	0	4	Local	Negligible
Chiffchaff	2	2	Local	Negligible
Willow Warbler	104	146	Local	Low
Goldcrest	42	46	Local	Negligible
Blue Tit	0	1	Local	Negligible
Great Tit	0	2	Local	Negligible
Coal Tit	44	51	Local	Negligible
Treecreeper	4	4	Local	Negligible
Jay	5	6	Local	Negligible
Jackdaw	0	1	Local	Negligible
Carrion Crow	1	1	Local	Negligible
Hooded Crow	6	6	Local	Low
Raven	0	2	Local	Negligible
Chaffinch	78	92	Local	Negligible
Goldfinch	7	11	Local	Negligible
Siskin	28	34	Local	Low
Linnet	1	3	Local	Medium
Lesser Redpoll	30	41	Local	Medium
Common Crossbill	6	6	Local	High
Bullfinch	11	13	Local	Medium
Reed Bunting	5	12	Local	Medium

Note: species capitalised in bold are NatureScot priority species at risk from wind farm development (SNH 2018a).

8.6.25 **Table 8.14** shows the peak wintering bird populations of conservation importance that were found within the potential construction disturbance zone (though also giving consideration to particularly sensitive species in a wider area around that).

Table 8.14. Conservation Importance of Wintering Birds in the Wind Farm Potential Disturbance Zone

Species	Peak count <500m from wind turbines	Peak count <500m from all infrastructure	Scale of Importance of Breeding Population Within Potential Disturbance Zone	Conservation Value Within Potential Disturbance Zone
Mute Swan	0	3	Local	Very high
WHOOPER SWAN	**0**	**1**	**LOCAL**	**MEDIUM**
WHITE-FRONTED GOOSE	**0**	**234**	**INTERNATIONAL**	**VERY HIGH**
GREYLAG GOOSE	**0**	**76**	**REGIONAL**	**MEDIUM**
Canada Goose	0	2	Local	Negligible
BARNACLE GOOSE	**0**	**1**	**LOCAL**	**HIGH**
Wigeon	0	10	Local	Low
Teal	0	64	Regional	Medium
Mallard	2	35	Local	Low
Red Grouse	6	8	Local	Low
BLACK GROUSE	**4**	**6**	**REGIONAL**	**MEDIUM**
Grey Heron	1	1	Local	Negligible
WHITE-TAILED EAGLE	**3**	**3**	**REGIONAL**	**HIGH**
MARSH HARRIER	**0**	**1**	**REGIONAL**	**HIGH**

Species	Peak count <500m from wind turbines	Peak count <500m from all infrastructure	Scale of Importance of Breeding Population Within Potential Disturbance Zone	Conservation Value Within Potential Disturbance Zone
HEN HARRIER	**1**	**2**	**REGIONAL**	**LOW**
Sparrowhawk	1	1	Local	Low
Buzzard	3	8	Local	Negligible
GOLDEN EAGLE	**2**	**2**	**LOCAL**	**HIGH**
Kestrel	2	2	Local	Low
GOLDEN PLOVER	**14**	**24**	**LOCAL**	**HIGH**
LAPWING	**0**	**1**	**LOCAL**	**MEDIUM**
Snipe	6	6	Local	Low
Woodcock	2	3	Local	Low
CURLEW	**0**	**10**	**LOCAL**	**MEDIUM**
Common Gull	0	42	Local	Low
HERRING GULL	**0**	**19**	**LOCAL**	**MEDIUM**
Black-headed Gull	0	8	Local	Low
Tawny Owl	1	2	Local	Negligible
Common Crossbill	11	11	Local	High
Snow Bunting	0	1	Local	High

Note: species capitalised in bold are NatureScot priority species at risk from wind farm development (SNH 2018a).

Effects of Construction Disturbance on NS Key Species

8.6.26 The following section assesses the construction disturbance effects on each of the NS (SNH 2018) key species found within the potential disturbance zone during the breeding season (**Table 8.13**) and at other times of year (**Table 8.14**).

Whooper Swan

8.6.27 During the baseline surveys, the only records of this species on the ground were a flock of seven that flew in to land on Loch a' Ghlinn Bhig on 8/11/22, and up to 12 feeding within the wider waterfowl survey area. Only a single bird was seen on the ground within the potential construction disturbance zone, a single bird on the lower ground beside the western end of the site access track. Any disturbance during construction would, therefore, be an effect of negligible magnitude and not significant.

Greenland White-fronted Goose

8.6.28 There are two potential pathways for disturbance to this species, disturbance of roosting geese on upland lochs, and disturbance of feeding birds on their feeding fields on the lower ground to the west of the Proposed Development. Whilst there were occasional records of up to 155 geese roosting on the small lochs in the north-eastern part of the survey area, these are located 850 m from the nearest proposed wind turbine at their closest point (Loch Luireach), so any disturbance during construction would be an effect of negligible magnitude and not significant. With regard to disturbance on the goose feeding grounds, a flock did feed regularly within 500 m of the western end of the site access track. Geese were seen in this zone in 36% of the wider surveys. There would be potential for construction works at this location (particularly works west of the A83 road) to disturb feeding geese, leading to a temporary effective loss of feeding habitat. Given that this would affect SPA birds feeding on land that is functionally linked to the SPA, this would be a **significant effect** (and is assessed further in the shadow Habitats Regulations Assessment in **Technical Appendix 8.7**).

Greylag Goose

8.6.29 There were no records of this species within the Proposed Development during the baseline surveys (other than overflying), but they used the fields at the western end of the site access track (up to 76 feeding within 500 m of that track). The construction works could, therefore, disturb these birds, resulting in a temporary effective habitat loss. This species has been classed as medium value (present in regionally important numbers), and this impact would be of up to medium magnitude, so it would be of minor significance and not significant.

Barnacle Goose

8.6.30 There was only a single record of a single bird within the potential construction disturbance zone (at the western end of the site access track), so any effects would be of negligible magnitude and not significant.

Black Grouse

8.6.31 Five black grouse lekking areas were located during the surveys, two of which held up to two lekking males and the others were just single lekking males. These leks did not appear to be strongly associated with particular fixed locations, with two of them just used by single males on single occasions. One of these areas does, though, lie within the potential construction disturbance zone, with lekking behaviour of up to two males observed on the existing site track. These birds have used different locations during each survey, from 220 m to 760 m from the nearest proposed wind turbine. Construction works could lead to a temporary displacement of up to two lekking males, but given that this would not be from a specific important location (rather these birds are just opportunistically using the forest track) and other alternative locations are available nearby (including one used in 2023 outside the potential impact zone), the magnitude of this effect would be low and not significant.

Red-throated Diver

8.6.32 A pair of red-throated divers was recorded nesting within the survey area in 2022 and 2023 (on different lochs, both to the east of the Proposed Development). Both locations were outside the potential construction disturbance zone, so any disturbance effect on this species would be of negligible magnitude and not significant.

Hen Harrier

8.6.33 Though there were no breeding records of this species within 2 km of any proposed wind turbines in 2022 or 2023, it did regularly overfly the survey area, indicating that it was part of a foraging range (albeit distant from any current breeding location). Displacement from construction disturbance is possible, but this would be an effect of at most low magnitude, which would be of minor significance and not significant.

Golden Eagle

8.6.34 A pair was active within the territory in which the site is located in 2022 and 2023, but no evidence was found of any egg-laying in either year. They were seen regularly over-flying the Proposed Development throughout the year. Displacement from construction disturbance is likely, but this would largely be from coniferous woodland and clear fell, habitats that are largely unsuitable for species (with most records relating to birds transiting the site rather than using its ecological resources). As a result, any disturbance effect would of at most low magnitude, which would be of minor significance and not significant.

Golden Plover

8.6.35 Only very small numbers of this species were recorded within the potential construction disturbance zone (peak 24), so construction disturbance would be of negligible magnitude and not significant.

Lapwing

8.6.36 There was only one record of a single bird of this species within the potential construction disturbance zone, so construction disturbance would be of negligible magnitude and not significant.

Curlew

8.6.37 There were only five records of up to 10 curlew within the potential construction disturbance zone (on the fields at the western end of the site access track), so construction disturbance would be of negligible magnitude and not significant.

Herring Gull

8.6.38 There were only five records of up to 19 herring gulls within the Proposed Development's potential construction disturbance zone (on the fields at the western end of the site access track), so construction disturbance would be of negligible magnitude and not significant.

Scarce raptor species

8.6.39 Several high value raptor species were observed flying over the site during the baseline surveys, including white-tailed eagle, red kite, osprey, marsh harrier, peregrine and merlin. All were, however, only seen infrequently, with no evidence of breeding within the potential construction disturbance zone or that it was important for foraging for any of them. One additional high value species was recorded breeding in the wider 2 km area (but

outside the potential construction disturbance zone): barn owl (single pair in 2023). Whilst some displacement of foraging birds may occur during construction, this effect would be of negligible magnitude on all these species and not significant.

Potential Operational Effects

Operational Displacement

Nature of Impact

8.6.40 The presence and operation of wind turbines could potentially displace birds from breeding and foraging areas. Birds may avoid the operational wind turbines and the surrounding area due to the visual appearance of large vertical structures in the landscape, the mechanical noises and wind noises of the blades, or the presence of periodic maintenance vehicles and personnel. Displacement due to operational wind turbines could force birds into less suitable habitats, reducing their ability to survive and reproduce. If not displaced, birds may experience reduced foraging success or reduced productivity. Displacement effects can vary over time as birds habituate to the presence of operating wind turbines or site-faithful birds are lost from the population.

8.6.41 **Table 8.13** shows the peak breeding bird populations that were found within the potential operational disturbance zone during the baseline surveys.

8.6.42 **Table 8.14** shows the peak wintering bird populations that were found during the baseline surveys within the potential operational disturbance zone.

Effects of Operational Disturbance on NatureScot Key Species

8.6.43 The following section assesses the operational disturbance effects on each of the NS key species that were found within the potential disturbance zone within the breeding season (**Table 8.13**) and at other times of year (**Table 8.14**).

Whooper Swan

8.6.44 The only records of this species on the ground during the baseline surveys, were a flock of seven that flew in to land on Loch a‘ Ghlinn Bhig on 8/11/22, and up to 12 feeding within the wider waterfowl survey area.

None were seen on the ground within the potential operational disturbance zone. Any disturbance during operation would, therefore, be an effect of negligible magnitude and not significant.

Greenland White-fronted Goose

8.6.45 The only potential pathway for operational disturbance to this species would be disturbance of roosting geese on upland lochs. Whilst there were occasional records of up to 155 geese roosting on the small lochs in the north-eastern part of the survey area, these are located 850 m from the nearest proposed wind turbine, so any disturbance during operation would be an effect of negligible magnitude and not significant.

Greylag Goose

8.6.46 No greylag geese were seen on the ground within the potential operational disturbance zone. Any disturbance during operation would, therefore, be an effect of negligible magnitude and not significant.

Barnacle Goose

8.6.47 No barnacle geese were seen on the ground within the potential operational disturbance zone. Any disturbance during operation would, therefore, be an effect of negligible magnitude and not significant.

Black Grouse

8.6.48 Five black grouse lekking areas were located during the surveys, two of which held up to two lekking males and the others were just single lekking males. These leks did not appear to be strongly associated with particular fixed locations, with two of them just used by single males on single occasions. One of these areas does, though, lie within the potential operational disturbance zone, with lekking behaviour of up to two males observed on the existing site track. These birds have used different locations during each survey, from 220 m to 760 m from the nearest proposed wind turbine. Operation of the wind farm could lead to a displacement of up to two lekking males, but given that this would not be from a specific important location (rather these birds are just opportunistically using the forest track) and other alternative locations are available nearby (including one used in 2023 outside the potential impact zone), the magnitude of this effect would be low and not significant.

Red-throated Diver

8.6.49 A pair of red-throated divers was recorded nesting within the survey area in 2022 and 2023 (on different lochs, both to the east of the Proposed Development). Both locations were outside the Proposed Development's potential operational disturbance zone, so any disturbance effect on this species would be of negligible magnitude and not significant.

Hen Harrier

8.6.50 Though there were no breeding records of this species within 2 km of any proposed wind turbines in 2022 or 2023, it did regularly overfly the survey area, indicating that it was part of a foraging range (albeit distant from any current breeding location). Displacement from operational disturbance is possible, but this would be an effect of at most low magnitude, which would be of minor significance and not significant.

Golden Eagle

8.6.51 A pair was active within the territory in which the site is located in 2022 and 2023, but no evidence was found of any egg-laying in either year. They were seen regularly over-flying the Proposed Development throughout the year. Displacement from operational disturbance is likely, but this would largely be from coniferous woodland and clear fell, habitats that are largely unsuitable for species (with most records relating to birds transiting the site rather than using its ecological resources). As a result, any operational disturbance effect would of at most low magnitude, which would be of minor significance and not significant.

Golden Plover

8.6.52 Only very small numbers of this species were recorded within the potential operational disturbance zone of the Proposed Development (peak 14), so construction disturbance would be of negligible magnitude and not significant.

Lapwing

8.6.53 No lapwing were seen on the ground within the potential operational disturbance zone. Any disturbance during operation would, therefore, be an effect of negligible magnitude and not significant.

Curlew

8.6.54 No curlew were seen on the ground within the potential operational disturbance zone. Any disturbance during operation would, therefore, be an effect of negligible magnitude and not significant.

Herring Gull

8.6.55 No herring gulls were seen on the ground within the potential operational disturbance zone. Any disturbance during operation would, therefore, be an effect of negligible magnitude and not significant.

Scarce raptor species

8.6.56 Several high value raptor species were observed flying over the site during the baseline surveys, including white-tailed eagle, red kite, osprey, marsh harrier, peregrine and merlin. All were, however, only seen infrequently, with no evidence of breeding within the potential operational disturbance zone of the Proposed Development or that it was important for foraging for any of them. One additional high value species was recorded breeding in the wider 2 km area (but outside the potential impact zone of the Proposed Development): barn owl (single pair in 2023). Whilst some displacement of foraging birds may occur during operation, this effect would be of negligible magnitude on all these species and not significant.

Direct Effects: Collision Mortality

8.6.57 There have been a number of wind farms that have caused significant bird mortalities through collision, but their characteristics are very different to those at the Proposed Development. Most notably, at Altamont Pass in California and Tarifa in southern Spain, large numbers of raptors have been killed through collision with wind turbines (Orloff and Flannery 1992, Janss 1998, Thelander *et al*. (2003). Such problems have occurred where large numbers of sensitive species occur in close proximity to very large numbers (hundreds/thousands) of wind turbines, and usually also where the wind farm area provides a particularly attractive feeding resource. At onshore wind farm sites in the UK, with similar bird densities to the site, collision rates have generally been very low and not considered to be significant (Meek *et al*. 1993, Tyler 1995, Bioscan 2001, Percival *et al*. 2009, Percival *et al*. 2013).

8.6.58 Reference NHZ population sizes were derived from Wilson *et al*. (2015).

Nature of Impact

8.6.59 Birds that collide with a wind turbine blade are likely to be killed or fatally injured. Increased mortality rates from collision with wind turbines could potentially affect the maintenance of bird populations, particularly for species that are otherwise experiencing poor reproductive or survival

levels due to other factors e.g. food availability. The frequency of collision with wind turbines is assumed to be dependent on the amount of flight activity across the site and the ability of birds to detect the rotating blades and take avoidance action.

8.6.60 Operational displacement and collision with wind turbines are spatially mutually exclusive (if a bird is displaced from the wind farm area it is not at risk of collision). However, displacement effects may change temporarily as birds that were at first displaced from an area may habituate to the presence of the operating wind turbines after a period of time and become exposed to the risk of collision.

8.6.61 **Table 8.15** summarises the collision risk analysis for each species. Data is presented separately for each of the two baseline survey years (2021-22 and 2023-24). For further details, see **Technical Appendix 8.5**.

8.6.62 **Table 8.15** gives the number of collisions predicted per year based on the precautionary NS avoidance rate of 99% for red kite and hen harrier, 99.5% for swans and divers, 99.8% for the two goose species and 98% for all of the other species, the percentage increase that this would represent over the baseline mortality and an assessment of the magnitude of these effects. The magnitude was predicted as low for white-tailed eagle in both years, low for golden eagle in 2021-22, and negligible for all the other species/years modelled.

Table 8.15: Collision Risk Modelling Predictions for the Proposed Development.

Species	Precautionary Predicted Number of Collisions per Year (NS avoidance rate)		Percentage Increase in Baseline Mortality		Magnitude
	2021-22	2022-23	2021-22	2022-23	
Whooper Swan	0.01	0	0.05%	0%	Negligible
Greenland White-fronted Goose	0.26	0.16	0.04%	0.02%	Negligible
Greylag Goose	0.02	0.02	0.002%	0.002%	Negligible

Species	Precautionary Predicted Number of Collisions per Year (NS avoidance rate)		Percentage Increase in Baseline Mortality		Magnitude
	2021-22	2022-23	2021-22	2022-23	
Red-throated Diver	0.01	0	0.02%	0%	Negligible
Black Grouse	0	0.01	0%	0.02%	Negligible
White-tailed Eagle	0.23	0.18	1.78%	1.34%	Low
Golden Eagle	0.30	0.15	1.89%	0.95%	Low/Negligible
Red Kite	0	0.005	0%	0.03%	Negligible
Hen Harrier	0.07	0.23	0.08%	0.26%	Negligible
Osprey	0.01	0	0.08%	0%	Negligible
Peregrine	0.02	0.02	0.05%	0.05%	Negligible
Merlin	0	0.01	0%	0.04%	Negligible
Golden Plover	0.12	0.03	0.004%	0.001%	Negligible
Herring Gull	0.01	0.02	0.0003%	0.001%	Negligible

8.6.63 The following section assesses the operational collision risk to each of the NS key species that were found within the collision risk zone (**Table 8.15**).

Whooper Swan

8.6.64 Only a single whooper swan flock of two birds was recorded flying through the collision risk zone at rotor height, in November 2021 (**Figure 8.7**). Whooper swan is listed on Schedule 1 of the Wildlife and Countryside Act and Annex 1 of the EU Birds Directive, so is of high value. Collision risk was estimated at 0.005 collisions per year based on the two winters' data (equivalent to a 0.03% increase over the baseline mortality), an effect of negligible magnitude that would not be significant.

8.6.65 There would be no threat to the regional or national population of this species, so no significant adverse effect, following the NS (SNH 2018a) guidance, would occur.

Greenland white-fronted Goose

8.6.66 Greenland white-fronted goose was classed as very high value as a qualifying feature of the Kintyre Goose Roosts SPA. Greenland white-fronted geese were regularly recorded flying through the collision risk zone in winter (**Figure 8.5**). The collision risk was predicted at 0.21 per year using the two baseline winters' data. This is equivalent to a 0.03% increase over the baseline mortality, an effect of negligible magnitude that would not be significant in both the context of the NHZ population and the SPA population. Further analysis in relation to the effects on the SPA population is included in **Technical Appendix 8.7**.

Greylag Goose

8.6.67 Greylag goose flight activity over the site was low (**Figure 8.7**), with a predicted collision risk of only 0.02 over the two years (a 0.002% increase over the baseline mortality), an effect of negligible magnitude, which would not be significant.

Red-throated Diver

8.6.68 There were occasional red-throated diver flights through the collision risk zone, flying between their breeding lochs and feeding areas out at sea, though most flights were observed outside this zone. Their flight lines are shown in the **Confidential Appendix TA 8.8** (as they indicate the locations of breeding sites). The collision risk was predicted at 0.02 per year using the two baseline winters' data. This is equivalent to a 0.05% increase over the baseline mortality, an effect of negligible magnitude that would not be significant in both the context of the NHZ population.

Black Grouse

8.6.69 Five black grouse flights were observed through the collision risk zone in total over the two year's surveys. The collision risk was predicted at 0.005 per year using the two baseline winters' data. This is equivalent to a 0.01% increase over the baseline mortality, an effect of negligible magnitude that would not be significant in the context of the NHZ population.

White-tailed Eagle

8.6.70 White-tailed Eagle is listed on Schedule 1 of the Wildlife and Countryside Act, so it is of high value. A total of 16 flights were recorded at rotor height through the collision risk zone (**Figure 8.3**). The resulting collision risk was predicted at 0.2 per year, equivalent to a 1.6% increase over the

baseline mortality (higher as a result of this species' relatively high vulnerability to collision). Collision risk to this species would be of low magnitude (in the context of the small NHZ population) but would not be significant.

Golden Eagle

8.6.71 Golden Eagle is listed on Schedule 1 of the Wildlife and Countryside Act, so is of high value. A total of 73 flights were recorded through the collision risk zone. Their flight lines are shown in the **Confidential Technical Appendix 8.8** (as they indicate the location of a potential breeding site). The resulting collision risk was predicted at 0.22 per year, equivalent to a 1.4% increase over the baseline mortality. Collision risk to this species would be of low magnitude (in the context of the NHZ population) but would not be significant.

Red Kite

8.6.72 Red kite is listed on Schedule 1 of the Wildlife and Countryside Act and Annex 1 of the EU Birds Directive, so is of high value. Only a single red kite flight was recorded at rotor height through the collision risk zone (**Figure 8.4**), with resulting collision risks predicted at 0.003 per year, equivalent to a 0.02% increase over the baseline mortality). Collision risk to this species would be of negligible magnitude and not significant.

Osprey

8.6.73 Osprey is listed on Schedule 1 of the Wildlife and Countryside Act and Annex 1 of the EU Birds Directive, so is of high value. Only four osprey flights were recorded at rotor height through the collision risk zone (**Figure 8.4**), with resulting collision risks predicted at 0.004 per year, equivalent to a 0.04% increase over the baseline mortality). Collision risk to this species would be of negligible magnitude and not significant.

Hen Harrier

8.6.74 Hen harrier was classed as high value as a species listed on Schedule 1 of the Wildlife and Countryside Act and Annex 1 of the EU Birds Directive. The information available on collision risk to hen harriers at existing wind farms is not yet comprehensive. That published suggests that they are not particularly vulnerable to collision and will forage and even nest in proximity to wind turbines in some circumstances (Steele 2005, Madders and Whitfield 2006). Very few harrier collisions have been reported, and

harrier collision rates are considerably lower than that recorded for raptors in general (Illner 2011), though there have been two hen harrier collisions documented at the Griffin Wind Farm in Perthshire.

8.6.75 Hen harriers were regularly seen flying over the Proposed Development throughout the year. Their flight lines are shown in the **Confidential Technical Appendix 8.8** (as they indicate the locations of breeding sites). The large majority of flights were recorded below rotor height, with the resulting collision risk predicted at 0.15 per year using the two years' data, equivalent to a 0.34% increase over the baseline NHZ mortality. Collision risk to this species would be of negligible magnitude and not significant.

Peregrine

8.6.76 Peregrine is listed on Schedule 1 of the Wildlife and Countryside Act and Annex 1 of the EU Birds Directive, so is of high value. Only four flights were recorded through the collision zone at rotor height during the two years' baseline surveys (**Figure 8.4**). The collision risk was very low (0.02 per year, equivalent to a 0.05% increase over the baseline mortality). Collision risk to this species would therefore be of negligible magnitude and not significant.

Merlin

8.6.77 Merlin is listed on Schedule 1 of the Wildlife and Countryside Act and Annex 1 of the EU Birds Directive, so is of high value. Only three merlin flights were recorded at rotor height through the collision risk zone (**Figure 8.4**), so the collision risk was very low (0.03 collisions per year, equivalent to only a 0.02% increase over the baseline mortality). Collision risk to this species would be of negligible magnitude and not significant.

Golden Plover

8.6.78 Golden plover flocks were regularly recorded flying through the collision risk zone at rotor height during the winter VP surveys, and a single flock was observed during the breeding season (**Figure 8.8**). Collison risk to golden plover (a high value receptor) was predicted to be 0.07 per year using the two years' baseline data. This would represent a 0.003% increase over the baseline mortality for this NHZ population, so would be an effect of negligible magnitude and not significant.

Herring Gull

8.6.79 Herring gulls observed flying through the collision risk zone at rotor height on two occasions, both during the breeding season (**Figure 8.7**). Collison risk to herring gull (a medium value receptor) was predicted to be 0.02 per year over the two baseline years. This would represent a 0.0006% increase over the baseline mortality for this NHZ population, so would be an effect of negligible magnitude and not significant.

Indirect Effects: Barrier Effect

8.6.80 A further potential operational disturbance effect could be disruption to important flight lines (barrier effect). Birds may see the Proposed Development and change their route to fly around (rather than through) it. This would reduce the risk of collision but could possibly have other effects, for example potentially making important feeding areas less attractive (by acting as a barrier to the birds reaching them) and (if diversions were of a sufficient scale) resulting in increased energy consumption. Greenland white-fronted geese have, for example, been recently shown to shift up to 300m from wind turbines during flights between feeding and roosting sites (Percival *et al*. 2024), with the main effect of this being a reduced collision risk. The distance needed to divert around the Proposed Development would be relatively small and would not be expected to act as a major barrier to movements, and no important regularly used flight routes across the proposed wind farm have been identified. Accordingly, the ecological consequences of any such changes in flight lines would be of negligible magnitude and not significant.

Assessment of Effects on Other High-Value Species

8.6.81 Common crossbill was breeding in the coniferous plantation (with up to six pairs within the potential impact zone) around the site and was also present there outside the breeding season. Though these numbers are only locally important, this species is classed as high value because it is specially protected from disturbance during the breeding season under Schedule 1 of the 1981 Wildlife and Countryside Act. Effects would be of negligible magnitude and not significant (but would still require mitigation to comply with the Wildlife and Countryside Act).

Assessment of Effects on Other Medium-Value Species

8.6.82 Eleven other medium-value species were recorded breeding in the potential impact zone of the Proposed Development: red grouse, cuckoo,

skylark, tree pipit, dunnock, song thrush, grasshopper warbler, linnet, lesser redpoll, bullfinch and reed bunting. All are Scottish Biodiversity List (SBL) species. None would be likely to be significantly affected by the Proposed Development, given experience from other wind farms (Meek *et al*. 1993, Phillips 1994, Thomas 1999, Percival 2005, Devereux *et al*. 2008), the fact that NS has not identified them as being at potential risk of impact from wind farms and their large regional and national population sizes. Effects would be of low/negligible magnitude and not significant.

Assessment of Effects on Other Low Value Species

8.6.83 The low value species are of lesser concern, as a higher magnitude impact would be necessary in order for a significant effect to occur. As these species are generally at low density within the core survey area, such a magnitude of effect would be very unlikely and it can be safely concluded that there would not be any significant effect on any of these species.

Effects on Protected Sites

European Protected Sites

8.6.84 The potential ornithological effects of the Proposed Development on European Protected Sites are assessed in **Technical Appendix 8.7**. Possible effects on the Kintyre Goose Roosts SPA Greenland white-fronted goose populations constituted the only possible Likely Significant Effect (LSE) of the Proposed Development in the context of the Habitats Regulations.

8.6.85 The Sound of Gigha SPA lies 600 m west of the Proposed Development and is designated for its wintering populations of great northern diver, Slavonian grebe, red-breasted merganser and eider. All of these are marine species that would be unaffected by the Proposed Development.

8.6.86 Arran Moors SPA lies 19 km south-east from the Proposed Development and is designated for its breeding hen harrier population. The Proposed Development lies outside the connectivity distance from this SPA so would not affect it.

8.6.87 The Proposed Development is (at the closest point) 540 m from Kintyre Goose Roosts SPA, though no wind turbines or other infrastructure would be located within 1 km of the SPA.

8.6.88 There would be a collision risk to the Greenland white-fronted goose population from this SPA and a risk of displacement from feeding fields

during the construction of the Proposed Development. Neither of these impacts would, however, threaten the integrity of any SPA population (see **Technical Appendix 8.7**). The conservation objective to maintain the species' population as a viable component of the SPA would not be undermined. This level of additional mortality would not represent an adverse effect on the integrity of any SPA.

Other Protected Sites

8.6.89 Rhunahaorine Point SSSI lies 1.7 km north-west of the Proposed Development and is notified for its natural features of coastal shingle, overwintering Greenland white-fronted geese and breeding little tern. The only interest feature that could be affected would be the Greenland white-fronted geese, which have been assessed as part of the Kintyre Goose Roosts SPA. Potentially significant effects could occur on these geese during construction (disturbance on their feeding grounds adjacent to the western end of the site access), requiring mitigation as set out in the following section.

8.6.90 No significant effects would be likely to occur on the ornithological interest features of any other statutory protected sites, with no other SSSIs with any ornithological interest features within 5 km.

8.7 Mitigation

8.7.1 One potentially significant ornithological effect of the Proposed Development (in EIA terms) as identified during the assessment process:

- Disturbance to foraging Greenland white-fronted geese during construction of the western end of the site access (to the west of the A83).

8.7.2 Additionally, NS requested mitigation to avoid causing disturbance to lekking black grouse during construction.

8.7.3 All of these mitigation measures would be secured through an appropriate planning condition.

8.7.4 Measures are also required to ensure that the Proposed Development complies with the biodiversity objectives of NPF4, and to ensure compliance with the 1981 Wildlife and Countryside Act.

Mitigation of the Construction Phase

8.7.5 The Applicant has committed to the production of a Construction Environmental Management Plan (CEMP) to the satisfaction of NatureScot and other relevant stakeholders, before construction commences, and this would follow Windfarm Good Construction Guidance (Scottish Renewables *et al.*, 2019). An outline CEMP is included as **Technical Appendix 2.1**. An Ecological Clerk of Works (ECoW) will be appointed to monitor the implementation of the CEMP and the Breeding Bird Protection Plan (BBPP).

8.7.6 A BBPP will be required to ensure compliance with the Wildlife and Countryside Act (a) to avoid any disturbance to species specially protected under Schedule 1 of that Act and (b) to avoid any damage to active nests. A draft BBPP is included within **Technical Appendix 8.6**.

8.7.7 To avoid any disturbance to lekking black grouse, no construction works will take place before 09:00 within 750 m of any lek sites during April and May (as requested by NS during the scoping process).

8.7.8 To avoid disturbance to feeding Greenland white-fronted geese, no construction works for the site access track will take place to the west of the A83 during October – March.

8.7.9 Several species specially protected from disturbance during breeding under Schedule 1 of the Wildlife and Countryside Act were recorded during the surveys, including hen harrier, merlin and common crossbill. It will be essential to ensure that no Schedule 1 species are disturbed during the breeding season, particularly during the construction phase. Therefore, a BBPP will be developed and implemented. Further surveys for red-throated diver, golden eagle, hen harrier, peregrine, merlin and common crossbill and any other Schedule 1 species will be undertaken to inform the BBPP at fortnightly intervals through the breeding season (March-August) during the construction period. If any nesting Schedule 1 birds were found, then potentially disturbing activities would be suspended for the breeding season within an appropriate zone (dependent on the location of the birds and the species involved, to be agreed with NS and the local authority, and following Goodship and Furness 2022), and in line with Forestry Commission Scotland guidance. The BBPP will also include measures to ensure the protection of all other nesting birds.

8.7.10 Where works affecting habitats that could be used by nesting birds take place between March and August (inclusive), they will only be carried out following an on-site check for nesting birds by an experienced ecologist. If this indicates that no nesting birds are likely to be harmed by the works,

then the works will proceed. If nesting birds are found to be present, work will not take place in that area until the adult birds and young have left the nest. A protection zone will be clearly marked around the nest site to prevent accidental disturbance or damage.

Mitigation of the Operational Phase

8.7.11 No specific ornithological mitigation is required for the operational phase of the Proposed Development, as no significant operational effects were identified in the assessment.

Biodiversity Enhancement Management Plan (BEMP)

8.7.12 The BEMP will deliver measures to offset habitat loss, including for the breeding black grouse on site (given the potential for displacement from the Proposed Development). This will deliver the biodiversity gain required under NPF4. These measures will include:

- Low-density woodland edge planting for black grouse;
- Nesting raft provision for red-throated divers;
- Peatland restoration; and
- Enhanced monitoring of Greenland white-fronted geese.

8.7.13 Further details are given in **Technical Appendix 7.6**.

8.8 Assessment of Residual Effects

8.8.1 The residual ornithological effects of the Proposed Development will be a non-significant loss of a small amount of upland moorland habitat to the elements of the Proposed Development, and a non-significant risk of disturbance and collision.

8.8.2 Using evidence from existing wind farms it is considered unlikely that there will be any long-term impact on the integrity of the study area's ornithological features, or the conservation status of the species found here.

8.9 Assessment of Cumulative Effects

8.9.1 The potential for cumulative ornithological effects was considered following the SNH 2018b guidance on 'Assessing the Cumulative Impacts of Onshore Wind Farms on Birds', considering impacts on the favourable

conservation status of key species within the relevant NHZ (in this case, NHZ 14 Argyll West and Islands).

8.9.2 This cumulative assessment has considered all developments within the same NHZ as the Proposed Development, Argyll West and Islands (NHZ 14). Data on the cumulative collision risks from other developments have been kindly supplied by NS (**Table 8.16**). This includes operational and consented developments, as well as those in the planning process (though not those in scoping as insufficient information was available to assess those).

8.9.3 All of the potential effects of wind farms (direct habitat loss and disturbance during construction; and collision risk and disturbance during operation) have the potential to contribute to the cumulative ornithological impacts, therefore have been considered in the cumulative assessment. Consideration of the cumulative collision risk was carried out to determine whether the Proposed Development could materially contribute to a potentially significant cumulative collision risk.

8.9.4 This cumulative assessment has scoped in all species with potential ecological linkage to SPAs, and all other key NS target species with non-negligible residual impacts predicted. This included:

- Cumulative collision risk to Greenland white-fronted goose;
- Cumulative collision risk to golden eagle; and
- Cumulative collision risk to white-tailed eagle.

8.9.5 Each of these is considered in turn below, using the information available from other developments that could contribute to the cumulative impacts, but given that full information from all developments is not available, a precautionary approach has been adopted to this cumulative assessment.

8.9.6 For all other species, the predicted residual effects of the Proposed Development, with regard to habitat loss and disturbance are so low (negligible magnitude) it was considered that these would not make any material contribution to any potentially significant cumulative impact at the NHZ level.

Table 8.16. Cumulative collision risks for NHZ 14 (source: NatureScot)

Site	Golden Eagle	Greenland White-fronted Goose	Hen Harrier	Red-throated Diver	White-tailed Eagle
Airigh	0.022	-	-	0.013	-
Allt Dearg	0.104	-	0.003	0.003	-
An Carr Dubh	0.063	-	0.025	0.020	1.228
Auchadauie	-	0.080	-	-	-
Beinn an Tuirc	0.002	-	-	-	-
Beinn an Tuirc Extension	0.080	0.110	-	-	-
Beinn Ghlas	0.034	-	-	-	-
Blarghour S36C	0.080	-	0.015	0.030	0.103
Blary Hill	0.001	0.117	0.136	-	-
Breakerie	0.028	0.017	0.016	-	0.031
Carraig Gheal	0.015	-	-	0.003	-
Clachaig Glen	0.148	-	0.051	-	-
Cour	0.034	-	0.036	0.031	-
Creag Dhubh (Strachur)	0.075	-	0.001	-	-
Deucheran Hill	0.0003	-	-	-	-
Earraghail	0.393	-	0.057	-	-
Freasdail	0.002	-	-	0.013	-
Glasvaar	0.067	-	0.006	-	0.138
High Constellation	0.099	0.070	0.050	-	0.013
Ladyfield	0.072	-	0.005	-	0.017
Rowan	0.028	-	0.001	-	-
Srondoire	0.092	-	-	-	-
Tangy Extension	-	0.003	-	-	-
Tangy IV	-	0.044	0.001	-	-
TOTAL	1.439	0.441	0.403	0.113	1.530
Proposed Development	0.224	0.211	0.152	0.005	0.204

Site	Golden Eagle	Greenland White-fronted Goose	Hen Harrier	Red-throated Diver	White-tailed Eagle
UPDATED TOTAL with Proposed Development	1.663	0.652	0.555	0.118	1.734
% increase in baseline mortality	10.6%	0.1%	0.6%	0.3%	13.6%
% population lost	1.6%	0.03%	0.2%	0.1%	4.3%

Greenland White-fronted Goose Cumulative Collision Risk

8.9.7 Greenland white-fronted goose collision risk at the Proposed Development is predicted at 0.21 per year using the two baseline winters' data, equivalent to a 0.03% increase over the baseline mortality. Cumulative collision risk from the other sites totalled 0.44, giving a combined cumulative risk of 0.65 collisions per year. This would be an increase of only 0.1% over the existing baseline, so it would be a negligible magnitude effect that would not be significant in both the context of the NHZ population and the SPA populations.

Golden Eagle Cumulative Collision Risk

8.9.8 Golden eagle collision risk is predicted at 0.22 per year at the Proposed Development, equivalent to 1.4% increase over the baseline mortality. This species was also at risk of collision at numerous other sites, with a total cumulative risk of 1.29 collisions per year. Combining the Proposed Development with the collision risk from these other sites gives an annual risk of 1.66, equivalent to a 10.6% increase over the existing baseline mortality (or 1.6% of the adult population).

8.9.9 Further consideration was given to the fact that this cumulative assessment is based on the sum of 22 separate worst-case assessments (see **Table 8.16**) of collision risk (applying a 99% avoidance rate). Whilst this worst case is appropriate for a precautionary assessment of a single site, when multiple worst cases are combined, it produces a highly unrealistic outcome. As a result, it was concluded that the cumulative collision risk to golden eagle would be at most low magnitude, which would result in an effect of minor significance, which would not be

significant. The NHZ 14 golden eagle population is currently at favourable conservation status, and cumulative collision risk would not threaten that status.

Hen Harrier Cumulative Collision Risk

8.9.10 Hen harrier collision risk is predicted at 0.15 per year at the Proposed Development, equivalent to 0.2% increase over the baseline mortality. This species was also at risk of collision at numerous other sites, with a total cumulative risk of 0.40 collisions per year. Combining the Proposed Development with the collision risk from these other sites gives an annual risk of 0.56, equivalent to a 0.6% increase over the existing baseline mortality (or 0.2% of the adult population). This would be a negligible magnitude effect that would not be significant in the context of the NHZ population.

Red-throated Diver Cumulative Collision Risk

8.9.11 Red-throated diver collision risk is predicted at 0.005 per year at the Proposed Development, equivalent to 0.3% increase over the baseline mortality. This species was also at risk of collision at several other sites, with a total cumulative risk of 0.113 collisions per year. Combining the Proposed Development Killean with the collision risk from these other sites gives an annual risk of 0.118, equivalent to a 0.3% increase over the existing baseline mortality (or 0.1% of the adult population). This would be a negligible magnitude effect that would not be significant in the context of the NHZ population.

White-tailed Eagle Cumulative Collision Risk

8.9.12 White-tailed eagle collision risk is predicted at 0.20 per year at the Proposed Development, equivalent to 1.6% increase over the baseline mortality. This species was also at risk of collision at several other sites, with a total cumulative risk of 1.53 collisions per year. Combining Killean with the collision risk from these other sites gives an annual risk of 1.73, equivalent to a 13.6% increase over the existing baseline mortality (or 4.3% of the adult population).

8.9.13 Further consideration was given to the fact that this cumulative assessment is based on the sum of seven separate worst-case assessments (see **Table 8.16**) of collision risk (applying a 95% avoidance rate). As

discussed for golden eagle above, whilst this worst case is appropriate for a precautionary assessment of a single site, it produces a highly unrealistic outcome when multiple worst cases are combined. As a result, it was concluded that the cumulative collision risk to white-tailed eagles would be at most low magnitude, which would result in an effect of minor significance, which would not be significant. The NHZ 14 white-tailed eagle population is currently at favourable conservation status, and cumulative collision risk would not threaten that status.

Summary

8.9.14 **Table 8.17** provides a summary of the effects of the Proposed Development on features of ornithological interest detailed within this chapter.

8.9.15 Overall, there are not likely to be any significant residual impacts on ornithology as a result of the Proposed Development. In relation to the key NS wider countryside test, the Proposed Development would not affect the favourable conservation status of any bird species of conservation importance within the NHZ, either alone or in-combination with other schemes. It would also not result in any adverse effect on the integrity of any SPA qualifying interests, nor would it result in any breach of the Habitats Regulations.

Table 8.17. Summary of the effects of the Proposed Development on features of ornithological interest.

Project Phase	Summary of Effect	Value	Magnitude	Nature of Effect			Mitigation Measure	Residual Significance
				Positive/ negative	Permanent/ temporary	Reversible/ irreversible		
Construction	Habitat loss: construction of infrastructure including wind turbine foundations and access tracks	Low/ negligible	Negligible	Negative	Temporary	Reversible	Avoidance of more sensitive habitats in design process (design mitigation)	Not significant
	Disturbance to Schedule 1 and Annex 1 breeding species	High	Negligible	Negative	Temporary	Reversible	Development and implementation of BBPP, to include pre-construction survey checks; if present avoid disturbing activity in proximity with species-specific buffer zone implemented.	Not significant
	Disturbance to lekking black grouse	Medium	Negligible	Negative	Temporary	Reversible	No construction within 750m of any leks before 09:00 during April and May.	Not significant
	Disturbance to other breeding species	Up to medium	Negligible	Negative	Temporary	Reversible	Pre-construction survey and active nests avoided.	Not significant
	Disturbance to feeding Greenland white-fronted geese	Very high	Negligible	Negative	Temporary	Reversible	No construction works for the site access track will take place to the west of the A83 during October – March.	Not significant
	Disturbance to other wintering birds	Up to high	Negligible	Negative	Temporary	Reversible	None required.	Not significant
Operation	Displacement of birds from zone around wind turbines	Up to high	Negligible	Negative	Temporary	Reversible	None required to mitigate significant effects but BEMP will deliver net benefit	Not significant
	Disturbance to Schedule 1 and Annex 1 breeding species	High	Negligible	Negative	Temporary	Reversible	None required.	Not significant
	Disturbance to lekking black grouse	Medium	Negligible	Negative	Temporary	Reversible	None required to mitigate significant effects but low-density woodland edge planting will deliver net benefit	Not significant
	Disturbance to other breeding species	Up to medium	Negligible	Negative	Temporary	Reversible	None required	Not significant
	Disturbance to wintering birds	Up to very high	Negligible	Negative	Temporary	Reversible	None required to mitigate significant effects but enhanced goose monitoring will deliver net benefit	Not significant
	Mortality through bird collision with wind turbines	Up to very high	Low/negligible	Negative	Temporary	Reversible	Avoidance of areas of higher flight activity (including goose flight corridor) (design mitigation)	Not significant

Project Phase	Summary of Effect	Value	Magnitude	Nature of Effect			Mitigation Measure	Residual Significance
				Positive/ negative	Permanent/ temporary	Reversible/ irreversible		
	Cumulative collision risk to Greenland white-fronted geese	Very high	Negligible	Negative	Temporary	Reversible	Avoidance of areas of higher flight activity (including goose flight corridor) (design mitigation)	Not significant
	Cumulative collision risk to other species	Up to high	Low/negligible	Negative	Temporary	Reversible	None required	Not significant

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