



Vale of Leven Wind Farm Limited

# Vale of Leven Wind Farm

Environmental Impact Assessment Report (Volume 1)

Chapter 7 - Ornithology

663510 – 3 (00)



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# 7 ORNITHOLOGY

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## 7.1 Introduction

7.1.1 This Chapter of the Environmental Impact Assessment Report ('EIA Report') evaluates the potential effects of the Vale of Leven Wind Farm (the 'Proposed Development') on ornithological features. This assessment was undertaken by MacArthur Green. All staff contributing to this Chapter have professional experience in ornithological impact assessment and surveys. The chapter includes the following elements:

- Scope and Methodology;
- Consultation Undertaken;
- Statutory and Planning Context;
- Existing Environment;
- Predicted Impacts;
- Mitigation;
- Summary of Residual Effects; and
- References.

7.1.2 This Chapter is supported by the following figures provided in Volume 2: Figures:

- Figure 7.1: Application Boundary and study areas;
- Figure 7.2: Ornithological Designated Sites within 20 km;
- Figure 7.3: Vantage Points and Viewsheds;
- Figure 7.4: Flight Activity: Osprey 2019 to 2020;
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- Figure 7.12: Breeding greylag Activity: 2019 to 2022;
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- Figure 7.14: Flight Activity: Wildfowl 2019 to 2020;
- Figure 7.15: Herring gull Activity: 2019 to 2022; and
- Figure 7.16: Flight Activity: Herring gull 2019 to 2020.

7.1.3 This Chapter is supported by the following Technical Appendix documents provided in Volume 3: Technical Appendices:

Appendix 7.1: Ornithology and associated annexes

- Appendix 7.1: Annex A: Ornithological Legal Protection
- Appendix 7.1: Annex B: Ornithological Survey Methodology
- Appendix 7.1: Annex C: Ornithological Survey Effort and General Information

- Appendix 7.1: Annex D: Ornithological Survey Results
- Appendix 7.1: Annex E: Collision Risk Assessments
- Appendix 7.1: Ornithology
- Appendix 7.1: Merkins Windfarm Ornithology Technical Report; and
- Appendix 6.6: Outline Biodiversity Enhancement Management Plan.

7.1.4 This Chapter is supported by the following confidential information (that will have restricted distribution) provided in Volume 3 of the EIAR:

- Appendix 7.3: Confidential Ornithology;
- Confidential Figure 7.2.1: Osprey Activity: 2019 to 2022; and
- Confidential Figure 7.2.2: Goshawk Activity: 2019 to 2022.

## 7.2 Scope and Methodology

### Scope of Assessment

7.2.1 This Chapter considers the potential effects on ornithology associated with the construction, operation and decommissioning of the Proposed Development. The specific objectives of the Chapter are to:

- describe the ornithological baseline;
- describe the assessment methodology and significance criteria used in completing the assessment;
- describe the potential significance of unmitigated effects (direct or indirect) on identified Important Ornithological Features (IOFs; CIEEM, 2018);
- describe the mitigation measures proposed to address likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation, including cumulatively with other projects.

### Elements Scoped Out of Assessment

7.2.2 No potential impacts were scoped out prior to commencement of surveys.

7.2.3 NatureScot (SNH 2018a) guidance provides a list of target species<sup>1</sup> potentially at risk of impacts from onshore wind farms in Scotland, either because they are rare or vulnerable or they are dependent on habitats which are limited or subject to land use change. Other non-target species recorded during baseline surveys, which are considered to be of Low Nature conservation importance, as defined by **Table 7.2** below, have been scoped out of the assessment.

Following consultation with NatureScot (see **Table 7.6**), all designated sites except Loch Lomond Special Protection Area (SPA) and Endrick Mouth and Islands Site of Special Scientific Interest (SSSI) have been scoped out of the assessment.

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<sup>1</sup> Target species are those species listed as Annex 1 (EU Birds Directive) and/or Schedule 1 (Wildlife and Countryside Act) and/or are Red Listed non-passerines (BOCC, Stanbury et al. 2021).

## Study area / survey area

- 7.2.4 Ornithological surveys for the Proposed Development commenced in March 2019 and were completed in August 2022. Surveys followed NatureScot (SNH, 2017) guidance and were undertaken within the study areas shown on **Figure 7.1** (see also **Technical Appendix 7.1, Annex B for methodologies and Annex C for survey effort details**).
- 7.2.5 The assessment focuses on the Site and appropriate study areas around the proposed turbine layout, based on NatureScot survey and assessment guidance (SNH 2016a; 2017; SNH 2018a,b,c). The specific study areas associated with this assessment are as follows:
- Ornithological designated sites: within 20 km of the Site (**Figure 7.2**);
  - Scarce breeding birds (Schedule 1, Annex I species<sup>2</sup>): up to a 2 km buffer around the proposed turbine layout (**Figure 7.1**);
  - Black grouse: up to a 1.5 km buffer around the proposed turbine layout (**Figure 7.1**);
  - Breeding birds (waders): up to 500 m around the proposed turbine layout and Site Access (**Figure 7.1**); and
  - Flight activity (vantage point) surveys: within the proposed wind turbine area and a 500 m buffer of the outermost turbine locations, referred to for collision risk modelling (CRM) purposes as the Collision Risk Analysis Area (CRAA) (see **Appendix 7.1 Annex E and Figure 7.3**).
  - Cumulative assessment – as per NatureScot guidance (SNH 2018b), the Natural Heritage Zone (NHZ) level is considered practical and appropriate for most breeding species, unless other geographical ranges are more relevant (e.g. reintroduction projects, national census study areas); and
  - In-combination assessment – required as part of the Habitats Regulations Appraisal (HRA) process, NatureScot (SNH, 2016a) guidance will be consulted to identify an appropriate study area per species scoped into the assessment.

## Desk Study

Ornithological surveys were initially undertaken for a previous wind farm proposal, Merkins Wind Farm (located within the Application Boundary of the Proposed Development) from September 2008 to August 2009. With approval from NatureScot (**Table 7.6**), data collected for the Merkins Windfarm Environmental Statement (ES; Lomond Energy, 2011) was considered as part of the baseline for the Proposed Development. Surveys for the Merkins Wind Farm followed previous NatureScot (SNH, 2005) guidance, and the survey areas are presented in **Technical Appendix 7.2: Merkins Windfarm Ornithology Technical Report** (Arcus Renewable Energy Consulting, 2011).

- 7.2.6 The following data sources have also been considered as part of the assessment:
- Pre-application consultation for the Site with NatureScot presented in the 'Vale of Leven Wind Farm Ornithology Technical Report 2019' (MacArthur Green, 2019);
  - British Trust for Ornithology (BTO) historic breeding raptor data; and

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<sup>2</sup> Scarce breeding birds are those listed on Annex 1 of the EU Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and in the case of the Proposed Development consists of any raptor and owl species listed on either Annex 1 or Schedule 1.

- NatureScot Sitelink (<https://sitelink.nature.scot/home>) for designated site information.

## Design Parameters

7.2.7 The assessment of potential effects is based on the information presented in **Chapter 2: Proposed Development**. In relation to describing impacts on ornithological features, the relevant design parameters used to determine the ‘worst-case’ Proposed Development involve:

- A layout of ten wind turbines with a rotor diameter of 172 m and hub height of 164 m. This gives an upper rotor tip height of 250 m and a lower rotor tip height of 78 m above ground.
- A construction period which would last for up to 21 months, comprising civil works (9 months), wind turbine delivery and erection (5 months) and wind turbine commissioning and site reinstatement (18 months). The number of bird breeding seasons potentially disrupted would depend on the month in which construction commences and the breeding season of the potentially affected species. The main breeding season of most birds at the Site extends from March to August. For the purposes of this assessment, it is assumed that, for any given species of bird, construction activities would commence during the breeding season and would therefore potentially affect a maximum of up to two breeding seasons.
- Proposed Development infrastructure will include wind turbines, turbine foundations, crane hardstanding, new access tracks, underground cabling, on-site substation, temporary construction compound and LiDAR unit.

## Baseline Survey Methodology

7.2.8 Baseline survey methodology followed guidance from NatureScot (SNH, 2005 for Merkins Wind Farm and SNH, 2017 for the Proposed Development) as well as ‘Bird Monitoring Methods’ (Gilbert *et al.* 1998) and ‘Raptors: Field Guide to Surveys and Monitoring’ (Hardey *et al.* 2013). A detailed description of the various survey methodologies is provided in **Technical Appendix 7.1**. Surveys comprised the following programme:

- Flight activity surveys: September 2008 to August 2009 and March 2019 to March 2020;
- Scarce breeding bird surveys: March to July 2009, March to August 2019 and March to August 2022;
- Breeding diver activity surveys: June and July 2009;
- Black grouse surveys: March to April 2009 and April and May 2019;
- Breeding bird surveys: April to June 2009, April to July 2019, and April to July 2022 (for Site Access only); and
- Winter walkover surveys: November 2008 to February 2009 and November 2019 to February 2020.

## Methodology for the Assessment of Effects

7.2.9 The significance of the potential effects of the Proposed Development has been classified by professional consideration of the sensitivity of the ornithological feature and the magnitude of the potential impact.

### *Outline Assessment Process*

- 7.2.10 This section defines the methods used to assess the significance of effects through the process of an evaluation of the sensitivity of a feature (a combination of nature conservation importance and conservation status) and magnitude of impact. The assessment focuses on the 'worst-case' Proposed Development as described in the Design Parameters section.
- 7.2.11 The assessment for wider-countryside interests (not relating to European sites covered by the HRA process) involves the following process:
- Identifying the potential impacts associated with the Proposed Development;
  - Considering the likelihood of occurrence of potential impacts where appropriate;
  - Defining the nature conservation importance and conservation status of the bird populations present to establish level of sensitivity;
  - Establishing the magnitude of the impact (both spatial and temporal);
  - Based on the above information, making a judgement as to whether or not the resultant unmitigated effect is significant with respect to the EIA Regulations;
  - If a potential effect is determined to be significant, suggesting measures to mitigate or compensate the effect where required;
  - Considering opportunities for enhancement where appropriate; and
  - Confirming residual effects after mitigation or enhancement are considered.

### *Sensitivity of Ornithological Features*

- 7.2.12 Determination of the level of sensitivity of an ornithological feature is based on a combination of the feature's nature conservation importance and conservation status. There are three levels of nature conservation importance (NCI) as detailed in **Table 7.1**.

**Table 7.2: Determining Factors of a Feature's NCI**

Importance	Description
High	<p>Populations receiving protection by an SPA, Ramsar Site, Site of Special Scientific Interest (SSSI) or which would otherwise qualify under selection guidelines.</p> <p>Species present in nationally important numbers (&gt;1% national breeding or wintering population).</p>
Medium	<p>The presence of breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).</p> <p>The presence of breeding species listed in Annex I of the Birds Directive (but population does not meet the designation criteria under selection guidelines).</p> <p>The presence of rare, Red-listed breeding species noted on the latest Birds of Conservation Concern (BoCC) Red list (Stanbury <i>et al.</i> 2021) or identified as being sensitive to Wind Farm development in SNH (2018a).</p> <p>Regularly occurring migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the Development Site.</p> <p>Species present in regionally important numbers (&gt;1% of NHZ or appropriate reference breeding population).</p>
Low	All other species' populations not covered by the above categories.

7.2.13 IOFs (as per CIEEM 2018) taken forward for assessment are those species of high or medium nature conservation importance (refer to **Table 7.11**); the conservation status of assessed IOFs is presented in **Table 7.12**.

7.2.14 As defined by NatureScot (SNH 2018a), the conservation status of a species is “*the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest*”. Conservation status is considered to be ‘favourable’ under the following circumstances:

- “*population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;*
- *the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and*
- *there is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis”.*

7.2.15 NatureScot (SNH 2018a) recommends that “*the concept of favourable conservation status of a species should be applied at the level of its Scottish population, to determine whether an impact is sufficiently significant to be of concern. An adverse impact on a species at a regional scale (within Scotland) may adversely affect its national conservation status*”. Thus, “*An impact should therefore be judged as of concern where it would adversely affect the existing favourable conservation status of a species or prevent a species from recovering to favourable conservation status, in Scotland.*”



- 7.2.16 In the case of non-designated sites in Scotland, the relevant regional scale for breeding species is usually considered to be the appropriate NHZ which the Site falls within. The Proposed Development is within NHZ 17 (West Central Belt). For some species, other distinct geographic areas may be more appropriate, for example if a species has been subject to a reintroduction programme, or if national censuses have used particular regions based on ecological principles.
- 7.2.17 For wintering or migratory species, the national UK population or flyway population is usually considered to be the relevant scale for determining effects on the conservation status, although again a species-specific approach is taken.

### **Magnitude of Impact**

- 7.2.18 The magnitude of potential impacts will be identified through consideration of the Site, the degree of change to baseline conditions predicted as a result of the Proposed Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.
- 7.2.19 An impact is defined as a change of a particular magnitude to the abundance and/or distribution of a population as a result of the Proposed Development. Impacts can be adverse, neutral or beneficial.
- 7.2.20 In determining the magnitude of impacts, the resilience of a population to recover from temporary adverse conditions is considered in respect of each potentially affected population.
- 7.2.21 Impacts are judged in terms of magnitude in space and time. There are five levels of spatial and temporal impact magnitude as detailed in **Table 7.3** and
- 7.2.22
- 7.2.23 **Table 7.4** respectively.

**Table 7.3: Spatial Magnitude of Impact**

Spatial Magnitude	Definition
Very High	Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80% of population lost or increase in additive mortality.
High	Major reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 21-80% of population lost or increase in additive mortality.
Medium	Partial reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 6-20% of population lost or increase in additive mortality.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 1-5% of population lost or increase in additive mortality.
Negligible	Very slight (or no discernible) reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Reduction barely discernible, approximating to the “no change” situation. Guide: <1% of population lost or increase in additive mortality.

**Table 7.4: Temporal Magnitude of Impact**

Temporal Magnitude	Definition
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 25-30 years), except where there is likely to be substantial improvement after this period. Where this is the case, long-term may be more appropriate.
Long term	Approximately 15-25 years or longer (see above).
Medium term	Approximately 5-15 years.
Short term	Up to approximately 5 years.
Negligible	<12 months.

**Significance of Effect**

- 7.2.24 The sensitivity of the IOF and the magnitude of the predicted impact will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects (**Table 7.5**).
- 7.2.25 **Table 7.6** summarises guideline criteria for assessing the significance of effects.

**Table 7.5: Determining Significance of Effects**

Significance of Effect	Definition
Major	The impact is likely to result in a long term significant adverse effect on the integrity of a feature.
Moderate	The impact is likely to result in a medium term or partially significant adverse effect on the integrity of a feature.
Minor	The impact is likely to adversely affect a feature at an insignificant level by virtue of its limitations in terms of duration or extent, but there will probably be no effect on its integrity.
Negligible	No impact.

**Table 7.6: Significance of effect matrix**

Sensitivity of IOF	Magnitude of Impact					
	High	Medium-High	Medium	Medium-Low	Low	Negligible
High	Major	Major	Major/ Moderate	Moderate	Moderate/ Minor	Minor
Medium-High	Major	Major/ Moderate	Moderate	Moderate	Moderate/ Minor	Minor
Medium	Major/ Moderate	Moderate	Moderate	Moderate/ Minor	Minor	Minor
Medium-Low	Moderate	Moderate	Moderate/ Minor	Minor	Minor	Negligible
Low	Moderate	Moderate/ Minor	Minor	Minor	Negligible	Negligible
Negligible	Minor	Minor	Minor/ Negligible	Minor/ Negligible	Negligible	Negligible

Effects of Major, Major/Moderate and Moderate significance are considered to be 'significant' in the context of the EIA Regulations and are shaded grey in the above table.

*Assessment of Residual Effect Significance*

- 7.2.26 If a potential effect is determined to be significant, measures to mitigate the effect to a non-significant level will be required, and the revised significance of residual effects after mitigation will be assessed.

*Requirements for Mitigation*

- 7.2.27 Mitigation will be required if the potential effect determines that there is an unmitigated moderate adverse or major adverse and therefore significant effect on any IOF identified in this Chapter.

## **Information to Inform a Habitats Regulations Appraisal**

- 7.2.28 The method for assessing the effects on a European Site (in this case, an SPA and Ramsar site) is different from that employed for wider-countryside ornithological interests. The Habitats Directive is transposed into domestic legislation by the Conservation (Natural Habitats, &c.) Regulations 1994 (the Habitats Regulations; UK Government, 1994), as amended by the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2012 (UK Government, 2012). Regulation 48 of the Habitats Regulations indicates a number of steps to be taken by the competent authority before granting consent (these are referred to here as a HRA). In order of application, the first four are:
- Step 1. Consider whether the project is directly connected to or necessary for the management of the designated site (Regulation 48 (1b)).
  - If not, Step 2. Consider whether the project, alone or in combination, is likely to have a significant effect on the designated site (Regulation 48 (1a)).
  - If so, Step 3. Make an Appropriate Assessment of the implications for the designated site in view of that designated site's conservation objectives (Regulation 48 (1)).
  - Step 4. Consider whether it can be ascertained that the proposal would not adversely affect the integrity of the designated site ('Integrity Test') having regard to the manner in which it is proposed to be carried out or to any conditions or restrictions subject to which they propose that the consent, permission or other authorisation should be given (Regulation 48 (5 & 6)).
- 7.2.29 It has already been established that the Proposed Development does not meet the criteria for Step 1. Information in regards to the assessment of the likely significant effects on SPAs in relation to the Proposed Development (Step 2), and if so, whether there may be an adverse effect on the SPA's integrity (Steps 3 and 4) are presented in this chapter. The results of baseline surveys and scientific conclusions presented as part of the EIA are used to inform the appraisal process.

## **Limitations and Assumptions**

- 7.2.30 Limitations exist regarding the knowledge base on how some species, and the populations to which they belong, react to impacts. A precautionary approach is taken in these circumstances, and as such it is considered that these limitations do not affect the robustness of this assessment.
- 7.2.31 It should be noted that whilst there have been revisions to the design across the Site life history, surveys across all the various seasons covered the relevant study areas detailed on Figure 7.1 as a minimum.

## **Embedded Mitigation**

- 7.2.32 The design layout process has sought to minimise the likelihood of significant effects on ornithological features, by undertaking the following:
- Locating infrastructure at least 500 m from any known nest site of a Schedule 1 breeding species; and
  - Locating wind turbines at least 500 m from any known black grouse lekking location.

7.2.33 During the construction phase, the following embedded mitigation would be implemented to ensure legal compliance and minimise the likelihood of significant effects on IOFs, and this has been taken into consideration in the assessment:

- To ensure all reasonable precautions are taken to avoid impacts on birds during construction and decommissioning, the Applicant will appoint a suitably qualified Ecological Clerk of Works (ECoW) prior to the commencement of construction and decommissioning and they will advise the Applicant and the Principal Contractor on all ornithological matters (with the assistance of a suitably qualified/licenced ornithologist if required). The ECoW will be required to be present on Site during the construction and decommissioning periods and will carry out monitoring of works and briefings with regards to any ornithological sensitivities on the Site to the relevant staff within the Principal Contractor and subcontractors; and
- A Breeding Bird Protection Plan (BBPP) will be implemented during construction of the Proposed Development. The BBPP will detail measures to ensure legal compliance and safeguard breeding birds known to be in the area and will include species-specific guidance. The BBPP shall include pre-construction surveys and good practice measures during construction. Pre- and during-construction surveys will be undertaken to check for any new breeding bird activity in the vicinity of the construction works. The ECoW will oversee the implementation of the above measures.

7.2.34 To reduce the risk of collisions of black grouse (and other species) any new fencing would be suitably marked, following guidance by Trout & Kortland (2012).

### 7.3 Consultation Undertaken

Consultation for this EIA Report was undertaken with the organisations shown in **Table 7.6**.

**Table 7.7: Summary of Scoping Responses**

Consultee	Type and Data	Summary of Consultation Response	Response to Consultee
NatureScot	Pre-scoping advice in response to Vale of Leven Technical Note December 2019 – email dated 14 <sup>th</sup> January 2020	While the previous Merkins Wind Farm data is old, we agree that the ornithology survey findings in 2019 are consistent with those in 2008 and 2009 for the Merkins Wind Farm and agree that another year of survey work is not required. Therefore we confirm that the baseline ornithology data for the proposed development collected in 2019 and 2020 and the ornithology data in 2008 and 2009 for the Merkins Wind Farm site is sufficient to inform the EIA for this proposal.	Noted.
		We agree that all designated sites apart from Loch Lomond SPA/ Ramsar and Endrick Mouth and Islands SSSI can be scoped out of the assessment. However, with regards to Loch Lomond SPA we do not consider that Capercaillie need to be included within the assessment.	Noted.
		Other consultees that should be contacted include the Central Scotland Raptor Study Group and BTO Scotland regarding any raptor records in the area and RSPB regarding any local black grouse records.	Raptor and black grouse data were obtained from BTO Scotland and RSPB respectively (no information was made available by the Central Scotland Raptor Study Group).
		There are no further key species [aside from black grouse, curlew, lapwing, goshawk, osprey and peregrine falcon] that we consider need to be included as part of the assessment.	Noted.
		The site is close to Glasgow Airport and Civil Aviation Authority may require lighting on these turbines. The proximity to major goose roosts and the Clyde SPA raises the possibility of lighting impacts and this should be fully considered as part of the EIA.	Lighting impacts on IOFs have been assessed in section 7.6: Operation – Lighting .

Consultee	Type and Data	Summary of Consultation Response	Response to Consultee
NatureScot	Pre-scoping advice in response to email 28 <sup>th</sup> October 2021 about survey requirements – email dated 11 <sup>th</sup> November 2021	We are content with the proposed approach – to use the 2008/09 and 2019/20 data supplemented with scarce breeding bird data from 2022.	Noted.
NatureScot	Scoping Opinion 26 <sup>th</sup> May 2022	We are content that one year of baseline ornithology data collected for the Proposed Development in 2019 and 2020 together with ornithology data collected in 2008 and 2009 for the Merkins Wind Farm Site.	Noted.
		We have previously advised the applicant of other consultees that should be contacted: Central Scotland Raptor Study Group and BTO Scotland, regarding any raptor records in the area; and RSPB Scotland regarding any local black grouse records.	Raptor and black grouse data were obtained from BTO Scotland and RSPB respectively (no information was made available by the Central Scotland Raptor Study Group).
		We are content with the assessment methods proposed.	Noted.
		As we have previously advised the applicant, there are no further key species that we consider need to be included as part of the assessment.	Noted.
		We are content with the policies and guidance referenced in the Scoping Report.	Noted.
RSPB	Scoping Opinion 26 <sup>th</sup> May 2022	The ornithological chapter of the EIA should consider all the components of the proposal including access roads (including the route on public roads to get the turbines on site), on site tracks, borrow pits, drainage, grid connection, substation, and temporary construction buildings/storage compounds. Disturbance, displacement (including barrier effects), loss of suitable habitat	These potential impacts have been considered for IOFs within Section 7.6: Predicted Impacts.

Consultee	Type and Data	Summary of Consultation Response	Response to Consultee
		(breeding, wintering and foraging) and collision risk should be assessed for all species.	
		<p>Information within the EIA report must demonstrate that the survey data are adequate, robust, and accurate. The following should be included:</p> <ul style="list-style-type: none"> <li>• Full information on the Vantage Point (VP) Survey work undertaken, including dates, times, and weather conditions;</li> <li>• Maps showing VP locations that also denote viewsheds;</li> <li>• Maps showing raptor foraging areas and flights;</li> <li>• Worked example(s) of collision risk calculations; and</li> <li>• Provision of raw data in order for independent verification of collision risk calculations.</li> </ul>	<p>The requested information has been presented in this Chapter, as well as the associated <b>Technical Appendix 7.1, Confidential Appendix 7.2, Figures 7.1 to 7.16 and Confidential Figures 7.2.1 and 7.2.2.</b></p>
		<p>The EIA Report should also include a plan for post-construction monitoring for collision mortality and breeding birds. The designated features of the Endrick Mouth and Islands SSSI being of particular concern in proximity to the site.</p>	<p>The post-construction monitoring programme has been determined as part of the proposed Biodiversity Enhancement Management Plan (see outline in <b>Technical Appendix 6.6</b>). The scope of the monitoring programme is considered to be appropriate and relevant to the predicted impacts on IOFs.</p>
		<p>We note in section 4.2.116 that a Habitat Management Plan (HMP) will be prepared and agreed by consultees as part of the EIA. This should be submitted with the application, including any proposals for mitigation or enhancement in relation to habitats and species.</p>	<p>The outline Biodiversity Enhancement Management Plan is presented in <b>Technical Appendix 6.6.</b></p>



Consultee	Type and Data	Summary of Consultation Response	Response to Consultee
		RSPB agrees that the available historic data and range of baseline surveys carried out/proposed is sufficient and appropriate to conduct a robust impact assessment.	Noted.
		Scottish Wildlife Trust, BTO, Raptor Study Group to be contacted for information with respect to the ornithology assessment.	Raptor and black grouse data were obtained from BTO Scotland and RSPB respectively (no information was made available by the Central Scotland Raptor Study Group).
		RSPB agrees that the proposed assessment methods are suitable for conducting a robust impact assessment.	Noted.
		RSPB is not aware of any further key species which need to be considered in the assessment, based on the information presented to date.	Noted.
		RSPB is not aware of any relevant policies or guidance documents not specifically mentioned.	Noted.

## 7.4 Statutory and Planning Context

### Legislation

7.4.1 Relevant European legislation and regulations have been reviewed and taken into account as part of this ornithological assessment. Of particular relevance is the following European legislation:

- EU Directive 2009/147/EC on the Conservation of Wild Birds ('Birds Directive');
- EU Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) ('Habitats Directive'); and
- EU Environmental Impact Assessment Directive 2014/52/EU.

7.4.2 The following national legislation and regulations, which have been amended as a consequence of EU exit (Scottish Government, 2019; 2020), is also considered as part of the ornithology assessment:

- UK Government (1981). The Wildlife and Countryside Act 1981 (as amended);
- UK Government. (2011). The Wildlife and Natural Environment (Scotland) Act 2011;
- UK Government. (1994). The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (The Habitats Regulations);
- UK Government. (2004). The Nature Conservation (Scotland) Act 2004 (as amended); and
- UK Government. (2017). The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended).

### Policy

7.4.3 **Chapter 4: Planning Policy** sets out the planning policy framework that is relevant to this Environmental Impact Assessment (EIA) Report. This ornithological assessment considers the relevant aspects of Scottish planning policy, Planning Advice Notes and other relevant guidance. Of relevance to ornithology are the following policies:

- Scottish Government (2000). Planning Advice Note 60: Planning for Natural Heritage;
- Scottish Government (2023). National Planning Framework 4 (NPF 4);
- JNCC and Defra (2012). UK Post-2010 Biodiversity Framework;
- Scottish Government (2017). Planning Advice Note 1/2013-Environmental Impact Assessment, Revision 1.0;
- Scottish Government (2022a). Scottish Biodiversity Strategy to 2045. Tackling the Nature Emergency in Scotland; and
- Scottish Government (2022b). The Scottish Government Onshore Wind Policy Statement 2022.

### Guidance

7.4.4 The following guidance has been considered:

- CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester;
- European Commission (2010). Natura 2000 Guidance Document Wind Energy Developments and Natura 2000'. European Commission, Brussels;
- NatureScot (2020a). General pre-application and scoping advice for onshore wind farms. Guidance;
- NatureScot (2020b). The Effect of Aviation Obstruction Lighting on Birds at Wind turbines, Communication Towers and Other Structures. NatureScot Information Note;
- Pearce-Higgins, J.W. (2021). Climate Change and the UK's Birds. British Trust for Ornithology Report, Thetford, Norfolk;
- Scottish Natural Heritage<sup>3</sup> (SNH) (2000). Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action. SNH Guidance Note;
- SNH (2016a). Assessing connectivity with Special Protection Areas (SPAs). Version 3;
- SNH (2016b). Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees Version 2;
- SNH (2017). Recommended Bird Survey Methods to inform impact assessment of Onshore Windfarms;
- SNH (2018a). Assessing significance of impacts from onshore windfarms on birds out with designated areas. Version 2;
- SNH (2018b). Assessing the cumulative impacts of onshore wind farms on birds. SNH Guidance Note;
- SNH (2018c). Environmental Impact Assessment Handbook – Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland;
- Scottish Executive Rural Affairs Department (2000). Habitats and Birds Directives, Nature Conservation; Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds (“the Habitats and Birds Directives”). Revised Guidance Updating Scottish Office Circular No 6/1995; and
- Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win, I. (2021). Birds of Conservation Concern 5: The population status of birds in the UK, Channel Islands and Isle of Man and second ICUN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747.

## 7.5 Existing Environment

The sections below provide information on statutory designations and a summary of target species recorded. For each target species recorded it can then be determined, based on baseline survey results and/or historic data, whether they can be reasonably

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<sup>3</sup> Please note that Scottish Natural Heritage rebranded as NatureScot on 1<sup>st</sup> May 2020, however references to documents prior to this date will still refer to SNH.

scoped out of the assessment at this stage as a result of a lack of likely significant effects at a population level.

### Designated Sites

7.5.1 The Site does not overlap with any statutory designated sites. There are four SPAs (underpinned by SSSIs and two Ramsar sites) within 20 km of the Site that include ornithological features, as detailed below in **Table 7.8** and shown on **Figure 7.2**.

**Table 7.8: Designated Sites within 20 km of the Proposed Development**

Name	Distance (km)	Qualifying Features	Status
Inner Clyde SPA and Ramsar	2.52	Redshank ( <i>Tringa totanus</i> ), non-breeding	14 Feb 2007 Favourable Maintained
Inner Clyde SSSI	2.52	Cormorant ( <i>Phalacrocorax carbo</i> ), non-breeding	28 Feb 2014 Unfavourable Declining
		Eider ( <i>Somateria mollissima</i> ), non-breeding	28 Feb 2014 Favourable Maintained
		Goldeneye ( <i>Bucephala clangula</i> ), non-breeding	28 Feb 2014 Favourable Maintained
		Oystercatcher ( <i>Haematopus ostralegus</i> ), non-breeding	28 Feb 2014 Favourable Maintained
		Red-breasted merganser ( <i>Mergus serrator</i> ), non-breeding	28 Feb 2014 Favourable Maintained
		Red-throated diver ( <i>Gavia stellata</i> ), non-breeding	28 Feb 2014 Favourable Maintained
		Redshank ( <i>Tringa totanus</i> ), non-breeding	28 Feb 2014 Unfavourable Declining
Endrick Mouth and Islands SSSI	6.28	Greenland white-fronted goose ( <i>Anser albifrons flavirostris</i> ), non-breeding	28 Feb 2009 Favourable Maintained
		Greylag goose ( <i>Anser anser</i> ), non-breeding	March 2014: Favourable Maintained
		Breeding bird assemblage: <ul style="list-style-type: none"> <li>• shelduck (<i>Tadorna tadorna</i>);</li> <li>• redshank (<i>Tringa tetanus</i>);</li> <li>• snipe (<i>Gallinago gallinago</i>);</li> <li>• shoveler (<i>Anas crecca</i>);</li> <li>• grasshopper warbler (<i>Locustella naevia</i>);</li> <li>• reed bunting (<i>Emberiza schoeniclus</i>);</li> <li>• tree pipit (<i>Anthus trivialis</i>);</li> <li>• redstart (<i>Phoenicurus phoenicurus</i>);</li> </ul>	28 Jun 2002 Favourable Maintained

Name	Distance (km)	Qualifying Features	Status
		<ul style="list-style-type: none"> <li>• pied flycatcher (<i>Ficedula hypoleuca</i>).</li> </ul> There is also a heronry at Gartfairn Wood.	
Loch Lomond SPA	6.48	Greenland white-fronted goose ( <i>Anser albifrons flavirostris</i> ), non-breeding	January 2017: Favourable Maintained
		Capercaillie ( <i>Tetrao urogallus</i> ), breeding	March 2013: Unfavourable Declining
Loch Lomond Ramsar	6.48	Greenland white-fronted goose ( <i>Anser albifrons flavirostris</i> ), non-breeding	January 2009: Favourable Maintained
Inchtavannach and Inchconnachan SSSI	11.70	Capercaillie ( <i>Tetrao urogallus</i> ), breeding	7 Apr 2008 Unfavourable declining
Inchcruin SSSI	10.85	Capercaillie ( <i>Tetrao urogallus</i> ), breeding	7 Apr 2010 Unfavourable Declining
Black Cart SPA	11.34	Whooper swan ( <i>Cygnus cygnus</i> ), non-breeding	29 Mar 2021 Unfavourable Declining
Black Cart SSSI	11.34	Whooper swan ( <i>Cygnus cygnus</i> ), non-breeding	14 Apr 2009 Favourable Declining
Renfrewshire Heights SPA and SSSI	11.67	Hen harrier ( <i>Circus cyaneus</i> ), breeding	31 Jul 2010 Unfavourable Declining
Castle Semple and Barr Lochs SSSI	17.35	Breeding bird assemblage: <ul style="list-style-type: none"> <li>• great crested grebe (<i>Podiceps cristatus</i>);</li> <li>• tufted duck (<i>Aythya fuligula</i>);</li> <li>• water rail (<i>Rallus aquaticus</i>);</li> <li>• sedge warbler (<i>Acrocephalus schoenobaenus</i>); and</li> <li>• reed bunting (<i>Emberiza schoeniclus</i>).</li> </ul>	31 Jul 2013 Favourable Maintained

## Birds Recorded During Desk and Field Surveys

### *Flight Activity Summary*

7.5.2 A summary of the results of the flight activity surveys carried out between 2008 to 2009 and 2019 to 2020 is presented in **Table 7.9**. It should be noted that this includes all flights recorded during the one-year survey period for the ten-turbine Merkins Wind Farm ES as well as the one-year survey period for the Proposed Development. Only a proportion of these flights would be considered in the CRM by fulfilling the criteria of being 'at-risk', i.e., (i) within the CRAA, (ii) within a surveyor's 2 km viewshed, and (iii) occurring at least partly at rotor height. A breakdown of flight activity per species is presented in **Technical**

**Appendix 7.1, Annex D (Proposed Development, 2019 to 2020) and the Merkins Windfarm Ornithology Technical Report (Merkins Windfarm, 2008 to 2009).**

**Table 7.9: Flight Activity Survey Results**

Species	2008-2009			2019-2020		
	Total Flights	Total Birds Recorded*	Total Bird Seconds Recorded**	Total Flights	Total Birds Recorded*	Total Bird Seconds Recorded**
Black grouse	2	3	35	1	1	11
Curlew	42	45	2709	0	0	0
Golden plover	3	30	1140	1	12	768
Goshawk	0	0	0	6	6	576
Greenland white-fronted geese	1	5	1200	0	0	0
Greylag geese	8	67	12160	1	4	560
Hen harrier	16	16	1895	7	7	617
Herring gull <sup>§</sup>	-	-	-	12	67	9968
Lapwing	3	3	35	0	0	0
Merlin	3	3	203	0	0	0
Osprey	3	3	345	7	7	990
Peregrine	11	11	710	0	0	0
Pink-footed geese	2	62	9974	6	426	57813
Red kite	4	10	2452	0	0	0
Whooper swan	0	0	0	1	21	1785

\* this is the total number of individuals recorded, i.e., number of flight events x number of birds present, e.g., in flock.

\*\* this is the total of the duration of each flight event multiplied by the number of birds present in that flight event.

§ herring gull was not considered to be a target species in 2008-09.

7.5.3 CRM was undertaken using the flight activity survey data collected for the Proposed Development between March 2019 to March 2020 during the baseline period (see **Table 7.10** and **Technical Appendix 7.1 Annex E** for further detail).

7.5.4 The results of the CRM using data collected between September 2008 to August 2009 for the Merkins Wind Farm, originally presented in the Merkins Wind Farm Ornithology Technical Report (2011), are also shown in **Table 7.10**. Although the planned layout and specifications of the Merkins project differs from that of the Proposed Development (modelled turbines were smaller at 82 m rotor diameter, 69-79 m hub height), it provides a useful additional indication of potential collision risk associated with a ten-turbine project within the Site.

7.5.5 Seven species (out of the total of 15 species shown in **Table 7.9**) showed no flights that were considered to be 'at-risk' and are therefore not included in **Table 7.10**.

**Table 7.10: Collision Risk Modelling Results**

Species	Merkins Wind Farm				Proposed Development			
	2008-09 NBR C.R. §	2009 BR C.R. §	2008-09 Annual	Years Per Collision	2019 BR C.R. §	2019-20 NBR C.R. §	2019-20 Annual	Years Per Collision
Curlew	0	0.093	0.093	10.7	0	0	-	-
Golden plover	0	0	-	-	0	0.021	0.021	48
Goshawk	0	0	-	-	0.011	0	0.011	88
Greylag goose	0.165*	0.000	0.165	6.0	0	0.004	0.004	272
Herring gull**	-	-	-	-	0.307	0	0.307	3
Osprey	0	0	-	-	0.021	0	0.021	47
Peregrine	0.004	0.005	0.009	111	0	0	-	-
Pink-footed goose	0	0	-	-	0	0.339	0.339	3

§ collision Rate (C.R.) per season: BR = Breeding Season; NBR = Non-breeding Season

\* calculated using a 99 % avoidance rate. NatureScot now recommends a 99.8 % avoidance rate for this species.

\*\* herring gull was not considered to be a target species in 2008-09.

### *Baseline data*

#### Raptors

##### *Osprey*

7.5.6 During the baseline surveys in 2019 and 2022, osprey was the most frequently recorded raptor species. Two pairs of ospreys (OP\_1 and OP\_2 – see **Confidential Figure 7.2.1**) were confirmed to be breeding outside the 2 km study area in 2022 at locations northeast of the Site. At least one chick fledged from the OP\_1 nest. The majority of flight activity in 2022 was recorded near the nest sites and over reservoirs in the Kilpatrick Hills to the southeast of the Site. In both 2019 and 2022, ospreys were observed hunting fish and transporting nesting materials. Occasional flights were recorded over the Site in 2019 (**Figure 7.4**).

7.5.7 A total of three single osprey flights were recorded within the 2 km study area between April to May 2009 (Figure 10.8 Merkins Windfarm Ornithology Technical Report), it is considered likely that these were passage birds. A fourth flight was seen beyond the study area in 2009 several kilometres to the east of the Site, this bird was thought to be probably hunting at the local reservoirs in that area (Merkins Windfarm Ornithology Technical Report). Glasgow Museums Resource Centre was contacted as part of the desk-based

study for the Merkins Windfarm ES (Lomond Energy Ltd, 2011), one record was held of an osprey flying over Gallangad Plantation within the 2 km study area, but no osprey breeding records were provided.

#### *Goshawk*

- 7.5.8 One pair of goshawks (GI\_1) were confirmed to be breeding outside the 2 km study area in 2022, to the east of the Site (**Confidential Figure 7.2.2, Confidential Appendix 7.2 Volume 3**), at least two chicks fledged from the nest. Occasional flights were recorded over the Site in 2019 and 2020 (**Figure 7.5**).
- 7.5.9 Goshawk was not recorded within the study area during baseline surveys in 2008 and 2009 (Merkins Windfarm Ornithology Technical Report).

#### *Hen harrier*

- 7.5.10 Hen harriers were recorded flying within the 2 km study area, including occasionally over the Site, mostly during the non-breeding seasons of 2008/2009 (Figure 10.9 Merkins Windfarm Ornithology Technical Report) and 2019/2020 (**Figure 7.6 and Figure 7.7**). No breeding evidence has been recorded during the baseline periods.

#### *Merlin*

- 7.5.11 Merlin were recorded flying within the 2 km study area, including occasionally over the Site. Three observations of single birds were recorded in October 2008, June 2009 and August 2009 (Figure 10.8 Merkins Windfarm Ornithology Technical Report) and a single bird was recorded in December 2019 (**Figure 7.7**). The desk-based study for the Merkins Windfarm ES (Lomond Energy Ltd, 2011) found that a historic merlin nest site is within 2 km to the north of the Application Boundary, but no breeding evidence has been recorded during the baseline periods.

#### *Peregrine falcon*

- 7.5.12 Peregrine falcons (single birds) were recorded flying within the 2 km study area, including over the Site, between October 2008 to July 2009 (Figure 10.10 Merkins Windfarm Ornithology Technical Report) and single birds were recorded flying in May 2019 and April 2022 in the 2 km study area (**Figure 7.7**). The desk-based study for the Merkins Windfarm ES (Lomond Energy Ltd, 2011) found that a historic peregrine nest site is beyond 2 km to the south from all infrastructure associated with the Proposed Development, but no breeding evidence has been recorded within the study area during the baseline periods.

#### *Red kite*

- 7.5.13 A total of four red kite flights involving between two and three individuals were all recorded on the edge of the Application Boundary on one day in October 2008 (Figure 10.8 Merkins Windfarm Ornithology Technical Report). No breeding evidence has been recorded within the study area during the baseline periods.



## Black Grouse

- 7.5.14 Results of baseline surveys showed that there is one potential black grouse lekking area within the 1.5 km study area: one lek of four males (but possibly up to six males) and one female was recorded in March and April 2009 at Auchenreoch ruins (Figure 10.6 Merkins Windfarm Ornithology Technical Report) located approximately 560 m from the nearest proposed turbine (T8) and 300 m from the Site Access (**Figure 7.8**). A pair of black grouse was recorded in flight at Auchenreoch ruins in November 2019 and a single male was recorded flying over the Site in May 2019 (**Figure 7.8**), but no lekking birds were recorded during baseline surveys from 2019 to 2022.
- 7.5.15 The RSPB, who were contacted as part of the desk-based study in September 2022, confirmed that the closest recorded lek (in 2012) was over 3.3 km to the north-east of the Application Boundary and the closest black grouse record (single male in flight in 2016) was recorded over 1.5 km to the south of the Application Boundary.

## Waders

### *Curlew*

- 7.5.16 Breeding bird surveys in 2009 identified one territory and seven other probable territories within 500 m of all infrastructure associated with the Proposed Development.
- 7.5.17 Baseline surveys in 2019 and 2022 identified a grassland area over 1.5 km north of the Application Boundary where up to five curlew territories were recorded (**Figure 7.9**). No territories were identified within 500m of proposed infrastructure in either 2019 or 2022. A single curlew was recorded once in May along the route of the Site Access in 2022, this bird was not thought to be breeding in this area.

### *Lapwing*

- 7.5.18 Baseline surveys in 2009, 2019 and 2022 did not identify any lapwing territories within 500 m of infrastructure associated with the Proposed Development. Two to four territories were identified in a grassland area over 1.5 km north of the Proposed Development in 2019 and 2022 (**Figure 7.9**). No territories were recorded in 2009.

### *Golden plover*

- 7.5.19 Baseline surveys in 2009, 2019 and 2022 did not identify any golden plover breeding territories.
- 7.5.20 Three small pre-breeding flocks (flock size two to 14 birds) were recorded flying over the Site in April 2009. Two small flocks (flock size nine to 12 birds) of golden plovers were recorded over the Site during the 2019/2020 non-breeding season and small numbers of pre-breeding birds (one to four birds) were recorded between March to April 2019 (**Figure 7.10 and Figure 7.11**).

### *Woodcock*

- 7.5.21 Baseline surveys in 2009, 2019 and 2022 did not identify any woodcock territories.
- 7.5.22 A single bird was recorded once in April 2019 in woodland over 2 km north of the Application Boundary (**Figure 7.10**). Non-breeding birds were recorded during the

2019/2020 non-breeding season in woodland beyond 500 m from all infrastructure associated with the Proposed Development.

#### *Snipe*

- 7.5.23 Breeding bird surveys in 2009 identified one territory and three probable territories within 500 m from infrastructure associated with the Proposed Development.
- 7.5.24 Baseline surveys in 2019 recorded a maximum of two snipe territories within 500 m of proposed infrastructure (**Figure 7.9**). Additional territories were also recorded beyond 500 m to the northeast and southeast of the Site in 2019. No territories were identified within 500 m of the Site Access.

#### Wildfowl

##### *Greylag goose*

- 7.5.25 One to two pairs of greylag geese were recorded breeding within the 2 km study area in 2019 on Black Linn Reservoir, approximately 1.7 km southeast of any proposed infrastructure (**Figure 7.12**). In 2022, one to two pairs of greylag geese were breeding on Fyn Loch beyond the 2 km study area, and no breeding activity on Black Linn Reservoir was recorded in 2022. Although Mitchell (2012) identifies one 1 km grid square approximately 1.7 km from the nearest proposed infrastructure (Turbine 1) as potentially suitable for foraging greylag geese, this species was not recorded foraging during baseline surveys. A few flocks of greylag geese (flock size four to 1,000 birds) were recorded flying across the Site during the non-breeding seasons of 2008/2009 (Figure 10.7 Merkins Windfarm Ornithology Technical Report) and 2019/2020 (**Figure 7.14**).

##### *Pink-footed goose*

- 7.5.26 Two flocks of pink-footed geese (flock size of 18 and 44 birds) were recorded in November 2008 and January 2009 within the 2 km study area (Figure 10.7 Merkins Windfarm Ornithology Technical Report). Although Mitchell (2012) identifies one 1 km grid square within 2 km of the Site as potentially suitable for foraging pink-footed goose, the only pink-footed geese recorded foraging during baseline surveys was one flock of 250 birds in a field over 3.5 km north of the Site in April 2022 (**Figure 7.13**).

##### *White-fronted goose*

- 7.5.27 A single flock of five white-fronted geese was recorded passing over the Site in October 2008 (Figure 10.7 Merkins Windfarm Ornithology Technical Report). One bird was recorded beyond 2 km study area in May 2019 (not mapped).

##### *Whooper swan*

- 7.5.28 A single flock of 21 whooper swans was recorded passing over the Site in March 2019 (**Figure 7.14**).

##### *Goldeneye*

- 7.5.29 A single goldeneye was recorded beyond the 2 km study area in March in 2019 and April in 2022 on Loch Bowie, no evidence of breeding was recorded (**Figure 7.13**).

### Red-throated Diver

- 7.5.30 In 2009, an unsuccessful red-throated diver breeding attempt was made at a location over 2 km to the east of the Site. No flights over the Site were observed during breeding season flight activity surveys (which included dawn and dusk watches) or during any other survey. This species was absent during surveys carried out from 2019 to 2022.

### Other target species

- 7.5.31 Within the 2 km study area, flocks of one to 17 herring gulls were occasionally recorded flying during the 2019 breeding season and 2019/2020 non-breeding season (**Figure 7.15 and Figure 7.16**). Roosting birds were recorded in 2019 and 2022 beyond 500 m from any proposed infrastructure.
- 7.5.32 Common crossbills (Schedule 1 species) were recorded in woodland within the 500 m study area during surveys between 2019 to 2022. A single kingfisher (Schedule 1 and Annex 1 species) was recorded calling along the River Leven in May 2019.

### **Ornithological Features Scoped out of the Assessment**

- 7.5.33 The assessment is applied to those scoped in IOFs of medium or high nature conservation importance that are known to be present within the Site or surrounding area (as confirmed through survey results and consultations outlined above). For other target species or designated sites, the data available suggest either that activity levels and Site usage is sufficiently infrequent, Site conditions are unsuitable, collision risks are so small and/or there is no connectivity to designated sites, that unmitigated significant effects are considered very unlikely. In such cases these species and designated sites can be scoped out of the assessment.

### *Designated Sites*

- 7.5.34 It was agreed during consultation with NatureScot that all designated sites, with the exception of the Loch Lomond SPA/ Ramsar site and Endrick Mouth and Islands SSSI can be scoped out due to a lack of potential connectivity. NatureScot further advised that the breeding capercaillie designated feature of the Loch Lomond SPA should also be scoped out (**Table 7.6**), leaving the remaining designated feature, non-breeding Greenland white-fronted goose, to be assessed.
- 7.5.35 There is considered to be potential connectivity (on the basis of distance alone) between the Proposed Development and the Loch Lomond SPA and Ramsar site based on the foraging range of Greenland white-fronted goose (5-8 km, SNH 2016), and so within the context of the HRA process, a potential Likely Significant Effect is concluded.
- 7.5.36 The habitat within and directly surrounding the Proposed Development comprises mainly blanket bog and heather moorland without waterbodies, which is considered to be of limited suitability to foraging geese. Some marsh/marshy grassland is present within the 2 km study area, and this can be suitable for white-fronted geese, however because presence was limited to only one flock of five birds recorded passing over the Site (in October 2008) during the whole of the baseline periods, it is evident that the Site and surrounding area is not used as a foraging area for this species. The most recent Wetland Bird Survey (WeBS) report (Austin *et al.* 2023) provides information on locations of

wintering Greenland white-fronted goose across the UK, and from this, it was shown that in the previous five years, flocks of the species were not recorded in any location within the Dumbarton/SE Argyll, Central or Lanarkshire/Strathkelvin recording areas, apart from at Loch Lomond. It is therefore likely that the Loch Lomond SPA and Ramsar site population is relatively sedentary throughout the winter, and as such, connectivity with the Site, and therefore displacement, barrier effects or collision impacts are very unlikely.

- 7.5.37 Based on the above evidence, it can be reasonably concluded that there would be **no adverse effects on the integrity** of Loch Lomond SPA / Ramsar site, and no further consideration is required.
- 7.5.38 Non-breeding greylag goose and Greenland white-fronted goose are qualifying features of the Endrick Mouth and Islands SSSI, alongside a breeding bird assemblage.
- 7.5.39 No impacts on the SSSI's Greenland white-fronted goose population are predicted for the reasons outlined above, and no connectivity with the breeding bird assemblage is likely due to the distance from the Site (over 5 km). Greylag goose can also be scoped out of the assessment due to low likelihood of disturbance-displacement impacts on breeding birds (recorded a minimum of 1.8 km southeast of any proposed infrastructure); the low level of suitability of the habitats within the Site and the low level of recorded Site activity; and the very low collision rate predicted. The baseline survey data are supported by data reported in Mitchell (2012) which show that the closest 1 km grid squares identified as potentially suitable for foraging greylag goose are beyond 1.7 km from the nearest proposed infrastructure. Based on this, it can be reasonably concluded that there would be **no significant effects** on the Endrick Mouth and Islands SSSI, and no further consideration is required.

#### *Non-designated Ornithological Features*

- 7.5.40 For all non-breeding species recorded (including hen harrier, merlin, peregrine falcon, red kite, golden plover, woodcock, pink-footed goose, whooper swan, goldeneye and herring gull), Site usage was infrequent, if occurring at all, and results of the flight activity surveys (**Table 7.9**) and collision risk modelling (**Table 7.10**) suggest that additional mortality due to collisions would be sufficiently small at a population level to scope them out of the assessment.
- 7.5.41 Curlew has been scoped out of the assessment based on the distribution of breeding activity with the study area. Although baseline surveys in 2009 identified one territory and up to seven probable territories within 500 m of all infrastructure associated with the Proposed Development, the most recent baseline surveys in 2019 and 2020 found that all curlew breeding activity was beyond 1.5 km north of the Proposed Development, with no associated collision risk. For similar reasons, lapwing has also been scoped out of the assessment.
- 7.5.42 Red-throated diver has been scoped out of the assessment due to a lack of records near the Site during the baseline periods, and the now likely absence as a breeding species in the local area.
- 7.5.43 In the case of the above scoped out breeding species, embedded mitigation measures (Embedded Mitigation section, paragraph 7.2.33) will minimise the likelihood of an impact

on any breeding attempt, should one take place within a potential risk area close to construction activities. Habitat management plans outlined in the Outline Biodiversity Enhancement Management Plan (**Technical Appendix 6.6**) will also generally improve foraging and nesting conditions within the Site for a range of species.

### Important Ornithological Features Scoped in to the Assessment

7.5.44 IOFs of medium or high nature conservation importance that have been scoped into the assessment are: osprey, goshawk and black grouse (**Table 7.11**).

**Table 7.11: Scoped In IOFs**

Species	Nature Conservation Importance	Status
Osprey	Medium	Annex 1, Schedule 1, BoCC Amber list
Goshawk	Medium	Schedule 1, BoCC Green list
Black grouse	Medium	BoCC Red list, sensitive to Wind Farm development (SNH 2018a)

7.5.45 In addition to nature conservation importance, it is necessary to consider the species' conservation status when assessing its sensitivity. Relevant conservation status information for the scoped in IOFs is detailed within **Table 7.12**.

**Table 7.12: Conservation Status of Scoped In IOFs**

Species	Conservation Status	Information
Osprey	Annex 1, Schedule 1, BoCC Amber list (HDrec, BR)	<p>Ospreys became virtually extinct as a breeding species in Britain during the 1900s due to human persecution, but since natural recolonisation in the 1950s there has been a steady increase in range and abundance in Scotland and northern England (Balmer <i>et al.</i>, 2013).</p> <p>Woodward <i>et al.</i> (2020) reported there to be 240 breeding pairs in the UK between 2013-17. Eaton <i>et al.</i> (2022) state a strong increase in breeding birds (+239%) over 25 years, thus, the national population is considered to be in favourable conservation status.</p> <p>Scotland holds the bulk of the population with 230 breeding pairs estimated in 2017 (Challis <i>et al.</i>, 2020). The NHZ 17 population was estimated by Wilson <i>et al.</i> (2015) to be 5 (range 1-9) breeding pairs in 2013 and based on 2019 data, the Central Scotland osprey population is at least 29 pairs (Challis <i>et al.</i>, 2020).</p> <p>It is likely that the NHZ population trend reflects the rise in the national population, and so the regional/NHZ population is assessed to have a <b>favourable conservation status</b>.</p>
Goshawk	Schedule 1, BoCC Green list	<p>There are an estimated 620 pairs in Britain (Woodward <i>et al.</i>, 2020). The regional NHZ 17 population was estimated by Wilson <i>et al.</i> (2015) to be &lt;5 pairs in 2013, but six pairs were monitored in</p>

Species	Conservation Status	Information
		<p>Central Scotland in 2019 (Challis <i>et al.</i>, 2020). As the goshawk population appears to be expanding in range in Scotland (Forrester <i>et al.</i>, 2012) and the species is BoCC Green-listed, the national and regional/NHZ populations are likely to be in <b>favourable conservation status</b>.</p>
Black grouse	BoCC Red List (HD, BDp, BDMp, BDMr)	<p>Black grouse is Red-listed due to a historical decline in the UK, without substantial recent recovery. It also qualifies due to a severe decline in the UK breeding population size of &gt;50 % over 25 years.</p> <p>Breeding numbers in the UK declined by 80 % between 1991 and 2004. Sim <i>et al.</i> (2008) estimated there to be 5,078 male black grouse in the UK in 2005, with approximately two-thirds of these occurring in Scotland. Woodward <i>et al.</i> (2020) estimated the UK population to be 4,850 males in 2016.</p> <p>Forrester <i>et al.</i> (2012) estimates that there are approximately 3,344 lekking males in Scotland (2,580-4,171 range) based on the 2005 national black grouse survey, an update to the 1995-96 survey which estimated 4,700 lekking males (range of 3,550-5,750). In Scotland, the breeding range is contracting and numbers are declining, though the rate of decline varies regionally, being higher in southwestern Scotland (-49%) compared to north Scotland (-16%) (Sim <i>et al.</i> 2008).</p> <p>Overall, the national and regional populations are in <b>unfavourable conservation status</b>.</p> <p>Balmer <i>et al.</i> (2013) provide a breeding distribution map for the species which shows a gap in presence across the Central Belt, to which NHZ 17 straddles. The local black grouse population would form part of the metapopulation across Loch Lomond, the Trossachs and Argyll, rather than the separate population in the south of Scotland. The regional NHZ 17 population was estimated by Wilson <i>et al.</i> (2015) to be 78 lekking males in 2005, but consideration should also be given to the larger Loch Lomond, The Trossachs and Breadalbane NHZ 15 population which was estimated to be 844 lekking males.</p>
<p>BoCC Red-list criteria (Stanbury <i>et al.</i> 2020):</p> <p>HD: historical decline in the breeding population.</p> <p>BDp: severe breeding population decline over 25 years/longer term.</p> <p>BDMp: moderate breeding population decline over 25 years/longer term.</p> <p>BDMr: moderate breeding range decline over 25 years/longer term.</p> <p>BoCC Amber-list criteria:</p> <p>HDrec: historical decline – recovery.</p> <p>BR: Breeding rarity. Species qualifies as rare breeders if the UK breeding population is &lt;300 pairs</p>		

## 7.6 Predicted Impacts

### Identified Impacts

7.6.1 This section provides an assessment of the likely effects of the Proposed Development on the IOFs scoped into the assessment. The assessment of effects is based on the project description outlined in Chapter 2 and is structured as follows:

- construction impacts – disturbance and direct habitat loss;
- operational impacts – collision risk, displacement and lighting.

### Construction

7.6.2 The main likely impacts of construction activities associated with the Proposed Development are the displacement and disruption of breeding, foraging and roosting birds as a result of noise and visual disturbance over a short-term period (either the duration of a particular construction activity within working hours, or the duration of the whole construction period – expected to be 14 months).

7.6.3 Impacts on birds would be confined to areas in the locality of temporary construction compounds, turbines, tracks and other infrastructure. Few attempts have been made to quantify the impacts of disturbance of birds due to activities of this type, and much of the available information is inconsistent. However, as a broad generalisation, larger bird species such as raptors, or those that feed in flocks in the open tend to be more susceptible to disturbance than small birds living in structurally complex habitats (such as woodland, scrub and hedgerow) (Hill *et al.*, 1997).

7.6.4 Direct habitat loss would also occur due to the Proposed Development's construction, which would be both temporary (e.g. construction compounds, borrow pits etc) and long-term or permanent (access tracks and turbines). This has the potential to impact on breeding, foraging or roosting individuals.

### *Osprey*

7.6.5 **Impact:** breeding or foraging osprey may be displaced during construction, either by disturbance or direct habitat loss.

7.6.6 **Sensitivity:** medium nature conservation importance (**Table 7.11**) and favourable conservation status (**Table 7.12**); overall medium sensitivity.

7.6.7 **Magnitude of Impact:** baseline surveys in 2022 found that two pairs of ospreys (OP\_1 and OP\_2) bred in forestland at least 2.5 km northeast from all proposed infrastructure. As no turbine locations or infrastructure associated with the Proposed Development is situated within 750 m of either nest location, construction disturbance will not directly affect osprey nesting. A BBPP (refer to Embedded Mitigation section, paragraph 7.2.33) would be in place to ensure that any future osprey breeding activity is undisturbed during the construction phase.

7.6.8 Osprey breeding and foraging locations are strongly linked to waterbodies; Loch Lomond lies to the northwest of the Proposed Development and reservoirs in the Kilpatrick Hills are located to the southeast. The edge of Loch Lomond is approximately 8 km to the west

of OP\_1 and OP\_2 and although this loch is potentially within osprey foraging range (core range of 10 km, SNH 2016) and could involve breeding birds flying over the northern area of the Proposed Development, baseline surveys indicated that osprey flight and foraging activity was primarily associated with reservoirs in the Kilpatrick Hills which are located south of OP\_1 and OP\_2. As the closest of these reservoirs (Black Linn Reservoir) is at least 1.8 km away from any infrastructure associated with the Proposed Development, it is unlikely that any foraging habitat will be lost/unavailable during the construction period.

7.6.9 Direct habitat loss as well as construction disturbance is therefore considered to be of negligible spatial and negligible temporal magnitude.

7.6.10 **Significance of Effect:** the unmitigated effect on the NHZ 17 osprey population as a result of construction disturbance is considered to be **Minor** adverse and therefore **Not Significant** in the context of the EIA regulations.

#### *Goshawk*

7.6.11 **Impact:** breeding or foraging goshawk may be displaced during construction, either by disturbance or direct habitat loss.

7.6.12 **Sensitivity:** medium nature conservation importance (**Table 7.11**) and favourable conservation status (**Table 7.12**); overall medium sensitivity.

7.6.13 **Magnitude of Impact:** baseline surveys in 2022 found that a pair of goshawks (GI\_1) bred in forestland at least 2.9 km northeast from all proposed infrastructure, at this distance it is unlikely that this breeding location would be significantly affected by construction disturbance associated with the Proposed Development. As goshawks breed and forage in woodland, and the habitat within the Site is primarily composed of blanket bog and heather moorland without forested areas, it is not likely that goshawk would be directly affected by habitat loss during construction. Direct habitat loss as well as construction disturbance is therefore considered to be of negligible spatial and negligible temporal magnitude.

7.6.14 **Significance of Effect:** the unmitigated effect on the NHZ 17 goshawk population as a result of construction disturbance is considered to be **Minor** adverse and therefore **Not Significant** in the context of the EIA regulations.

#### *Black Grouse*

7.6.15 **Impact:** lekking, foraging or breeding black grouse may be displaced during construction, either by disturbance or direct habitat loss.

7.6.16 **Sensitivity:** medium nature conservation importance (**Table 7.11**) and with the regional and national populations considered to be of unfavourable conservation status (**Table 7.12**), overall black grouse sensitivity is considered to be medium-high.

7.6.17 **Magnitude of impact:** according to an expert review by Goodship and Furness (2022), black grouse were determined to have a 'medium' overall likely sensitivity to disturbance, and lekking males may be disturbed at 500-750 m from source. Nesting females and non-breeding birds were assessed as having a disturbance distance of 100-150 m.



- 7.6.18 NatureScot has in recent times also advocated that a buffer of up to 750 m should be applied to avoid all disturbance during the construction phase, based on information in Zwart *et al.* (2015).
- 7.6.19 Baseline surveys in 2009 recorded one black grouse lekking area within the 1.5 km study area (Figure 10.6 Merkins Windfarm Ornithology Technical Report): one lek of up to six males and one female in attendance was recorded at Auchenreoch ruins approximately 560 m from the nearest proposed turbine (T8) and 300 m from the proposed construction compound (**Figure 7.8**).
- 7.6.20 Baseline surveys in 2019 recorded a pair of black grouse flying over Auchenreoch ruins in November and a single male flying over the Site in May, but no lekking birds were recorded in 2019 or 2022 and the RSPB confirmed that they hold no records of active lek sites within 3.4 km of the Site.
- 7.6.21 On balance, it is likely that the local lek is now extinct, although it is possible that the Site is still occasionally used by foraging or dispersing birds. The Embedded Mitigation section outlined in paragraph 7.2.33 includes pre-construction surveys and restriction measures within a BBPP which would avoid disturbance to any lekking or breeding birds, should pre-construction surveys record them within 750 m of planned construction activities, including the construction compound. Ongoing construction activities may on occasion limit the ability of some birds to move freely across the Site and thus connectivity between the nearest lekking or foraging sites could be temporarily reduced. Construction disturbance is therefore considered to be of low spatial and short-term temporal magnitude for the population.
- 7.6.22 **Significance of Effect:** the effect on the regional (NHZ 17 / Loch Lomond & Trossachs) black grouse population as a result of habitat loss and construction disturbance is considered to be **Moderate/Minor adverse** and therefore **Not Significant** in the context of the EIA regulations.

#### **Operation – Collision Risk**

- 7.6.23 Birds that utilise the airspace within the Site at potential collision heights during the lifetime of the Proposed Development will be at risk of collision with turbines. The risk of collision with moving wind turbine blades may be related to various factors including the amount of flight activity over the site, the topography of the site, the species' behaviour, and the ability of birds to detect and manoeuvre around rotating turbine blades.
- 7.6.24 Collision risk modelling was undertaken as part of the baseline analysis (refer to **Table 7.10** and Volume 3, **Technical Appendix 7.1: Ornithology Annex E**) which results in a predicted annual collision rate for the Proposed Development, to which the associated additional mortality is then (for those IOFs identified) assessed within the context of the species' reference populations to determine the significance of any losses.

#### *Osprey*

- 7.6.25 **Sensitivity:** medium.
- 7.6.26 **Magnitude of Impact:** osprey flights were recorded on seven occasions during flight activity surveys in 2019-20, with an estimated annual collision rate of 0.021, or one

collision every 47 years (**Table 7.10**). Only three flights were recorded in 2008-09, and no collision rate estimate was provided for the Merkins Wind Farm assessment. As the predicted collision rate would be at most one bird during the lifetime of the Proposed Development, this small increase in baseline mortality is therefore predicted to result in a long-term, negligible impact magnitude.

- 7.6.27 **Significance of Effect:** the unmitigated effect on the NHZ 17 osprey population as a result of collisions is considered to be **Minor** adverse and therefore **Not Significant** in the context of the EIA regulations.

#### *Goshawk*

- 7.6.28 **Sensitivity:** medium.
- 7.6.29 **Magnitude of Impact:** goshawks were recorded on six occasions during flight activity surveys in 2019-20, with an annual collision rate of 0.011 (or one bird every 88 years) predicted. No flights were recorded in 2008-09. This very small increase in baseline mortality is therefore predicted to result in a long-term, negligible impact magnitude.
- 7.6.30 **Significance of Effect:** the unmitigated effect on the NHZ 17 goshawk population as a result of collisions is considered to be **Minor** adverse and therefore **Not Significant** in the context of the EIA regulations.

#### *Black grouse*

- 7.6.31 **Sensitivity:** medium-high.
- 7.6.32 **Magnitude of Impact:** a single black grouse flight was recorded during flight activity surveys in 2019-20, but as this flight was below 20 m and therefore considered not 'at-risk' as it was below the lowest turbine blade tip height, no collision risk was predicted. This was also the case for the two flights recorded in 2008-09. Although collisions with other infrastructure, such as any new fencing is possible, Embedded Mitigation includes the commitment to adding visible markers to these forms of infrastructure, thereby reducing the likelihood of collision.
- 7.6.33 Collision risk for this species is therefore considered to be of long-term, negligible magnitude.
- 7.6.34 **Significance of Effect:** the unmitigated effect on the NHZ 17 black grouse population as a result of collisions is considered to be **Minor** adverse and therefore **Not Significant** in the context of the EIA regulations.

### **Operation – Displacement**

- 7.6.35 The displacement of nesting and foraging birds from the Proposed Development has the potential to extend beyond the construction phase, as described above, and to occur during the operational phase. It is recognised that disturbance may occur due to maintenance activities throughout the operational phase, although since these are likely to be of shorter duration and smaller extent than construction activities, effects will be lower than those predicted for construction impacts (refer to previous Construction section).

- 7.6.36 An additional consideration is the displacement of birds from larger areas where the wind turbines act as a barrier to bird movement. The likelihood of this effect occurring tends to increase with wind farm size, where large turbine arrays can force birds to alter their regular flightpaths, resulting in an increase in distance flown and so energy expended. Humphreys *et al.* (2015) concluded that the extent to which barrier and displacement effects have been differentiated between in the field is however highly debatable as both are manifested as a reduction of birds within the wind farm (see also Cook *et al.* 2014). It may be the case therefore that barrier effects are already accounted for as displacement effects.

#### *Osprey*

- 7.6.37 **Impact:** breeding osprey may be at risk of displacement from nesting or foraging, thereby impacting on productivity, fitness and survival rates.
- 7.6.38 **Sensitivity:** medium.
- 7.6.39 **Magnitude of Impact:**
- 7.6.40 Both osprey nest sites recorded during baseline surveys in 2022 (OP\_1 and OP\_2 – see **Confidential Figure 7.2.1**) were outside of the 2 km study area to the east, and at these distances, no direct disturbance to nesting birds would occur because of the Proposed Development.
- 7.6.41 The majority of flight activity in 2022 was recorded near the nest sites and over reservoirs in the Kilpatrick Hills to the southeast of the Site, suggesting the Site, with a lack of suitable waterbodies in proximity and the area to the west of the Site, is of relatively low importance for foraging adults. Overall, it is considered unlikely that the Proposed Development would affect the breeding success of any breeding ospreys, and so a long-term negligible impact magnitude is predicted.
- 7.6.42 **Significance of Effect:** the unmitigated effect on the NHZ 17 osprey population as a result of displacement is considered to be **Minor** adverse and therefore **Not Significant** in the context of the EIA regulations.

#### *Goshawk*

- 7.6.43 **Sensitivity:** medium.
- 7.6.44 **Magnitude of Impact:** one goshawk pair (GI\_1) was confirmed as breeding over 2 km to the east of the Site in 2022 (**Confidential Figure 7.2.2, Confidential Appendix 7.2 Volume 3**), and at this distance, no disturbance to nesting birds would result from the Proposed Development.
- 7.6.45 Occasional flights were recorded over the Site in 2019 and 2020 (**Figure 7.5**), and display behaviour was recorded over nearby forestry early in the 2019 breeding season, but no activity was subsequently observed during the remainder of the season. It is not clear whether this area of forestry forms part of the breeding goshawk GI\_1 territory, or may have the potential to be part of a separate territory, but with wind turbines around 500 m or more away from the forest edge, their presence is unlikely to affect the extent or viability

of an existing, or future second territory. Overall, a long-term negligible impact magnitude is predicted for the species.

- 7.6.46 **Significance of Effect:** the unmitigated effect on the NHZ 17 goshawk population as a result of displacement is considered to be **Minor** adverse and therefore **Not Significant** in the context of the EIA regulations.

#### *Black grouse*

- 7.6.47 **Sensitivity:** medium-high.
- 7.6.48 **Magnitude of Impact:** the black grouse lek recorded during 2009 surveys was located approximately 560 m from the nearest proposed turbine (T8, **Figure 7.8**) and is therefore beyond the minimum operational disturbance limit of 500 m recommended for black grouse (Goodship and Furness, 2022). The substation for the Proposed Development is located 300 m away from the historical lek and although there may be some natural screening due to topography, it is possible that at this distance, the lek site would no longer be viable due to the possible noise and visual (including lighting) impacts associated with the operational substation.
- 7.6.49 As outlined above in the Construction section, it is considered likely that this lek is now extinct, with no activity recorded there in 2019 and 2022. It is unclear what the proximate cause of this loss is, but it is more likely to be a consequence of wider population and range declines rather than site-specific changes. It is likely that the lek was at the edge of the Loch Lomond & Trossachs metapopulation and therefore more susceptible to population-level impacts than leks within the core breeding area.
- 7.6.50 The presence of the substation would however reduce the likelihood of black grouse returning to the lek site in the future, although it is possible that birds could lek in the area, but further from the substation.
- 7.6.51 The consequence of the possible loss of this (historic) lek site is unclear but being at the edge of the Loch Lomond & Trossachs metapopulation, the likelihood of natural reestablishment over the short-term is low. However, as a worst-case, long-term unmitigated impact of low magnitude is predicted.
- 7.6.52 **Significance of Effect:** the unmitigated effect on the regional (NHZ 17 and Loch Lomond & Trossachs) black grouse population as a result of displacement is considered to be **Moderate/minor** adverse and therefore **Not Significant** in the context of the EIA regulations.

#### **Operation – Lighting**

- 7.6.53 As the wind turbines would be in excess of 150 m to blade tip, they are required to be lit pursuant to Article 222 of the UK Air Navigation Order (ANO) 2016. As advised by NatureScot (2020b), there are potential wind turbine lighting impacts on birds which therefore require consideration within an EIA.

## All IOFs

- 7.6.54 **Impact:** wind turbine lighting could have various impacts on birds: they may be attracted to lights and thereby placed at higher risk of collisions, have migration patterns disrupted, show avoidance of lights with a consequent displacement impact, or be subject to increased predation threat. NatureScot (2020b) has identified attraction (phototaxis) as posing the principal threat to birds, in relation to Wind Turbines.
- 7.6.55 **Sensitivity:** medium (osprey, goshawk), medium-high (black grouse).
- 7.6.56 **Magnitude of Impact:** In NatureScot's (2020a) advice on the scope of assessment for wind turbine lighting, it is identified that an assessment of the possible impacts of lighting on birds may be required in the following three situations, where risk is greater:
1. wind turbines on or adjacent to a seabird colony that hosts burrow nesting species;
  2. wind turbines that are on or adjacent to protected areas that host large concentrations of wintering waterbirds, where such sites are located within open country away from other sources of artificial light; and
  3. where wind farms are located on migratory corridors or bottlenecks for nocturnally migrating passerines.
- 7.6.57 It is clear that the Proposed Development does not fit the first two situations. In the case of migrating species, there is no evidence to suggest that the Site is of any importance as a migration route, with relatively few wildfowl flights recorded for example. The habitats on Site are generally unpreferred for the IOFs, and the topography within the Site itself does not suggest that it would be a significant flight corridor (with birds more likely to follow the River Leven valley or the Clyde), and it is distant from coastal areas which would be of greater importance to continental migrants.
- 7.6.58 As such, based on the guidance provided by NatureScot (2020a, b), it is considered that there is little evidence to indicate that any species would be significantly impacted either negatively or positively by wind turbine lighting requirements of the Proposed Development. An impact of negligible, long-term magnitude is therefore predicted for all IOFs.
- 7.6.59 **Significance of Effect:** the level of significance of wind turbine lighting on IOFs is predicted to be **Minor** adverse and therefore **Not Significant** in the context of the EIA regulations.

## 7.7 Decommissioning

- 7.7.1 Decommissioning effects for the Development are difficult to predict with any confidence because of the long timeframe until their occurrence. Decommissioning impacts are considered for the purpose of this chapter to be similar in nature to those of construction impacts but are likely to be of shorter duration, although it should be noted that decommissioning of the existing wind turbines would be undertaken as part of the repowering of the Proposed Development.
- 7.7.2 The significance of effects predicted in the Construction section are therefore considered appropriately precautionary for assessing decommissioning effects on IOFs.

## 7.8 Mitigation

### Construction

- 7.8.1 No significant construction effects were predicted for any IOF, and therefore no specific mitigation other than the embedded mitigation outlined (BBPP, ECoW and pre-construction surveys) is required for osprey or goshawk. These measures will aim to ensure that no breeding activity is disrupted by construction activities.

### *Black Grouse*

- 7.8.2 Specific pre-construction surveys for lekking black grouse will be undertaken during the main black grouse lekking season (March to May), following methodology provided by Gilbert *et al.* (1998) and NatureScot (SNH, 2017) to provide an up-to-date understanding of whether black grouse are present.
- 7.8.3 To avoid a significant disturbance effect occurring during construction, the BBPP would also extend to protection of any black grouse leks (as well as nest sites). If pre-construction surveys do record lekking black grouse within a potential disturbance zone (up to 750 m from any proposed construction works), all potentially disturbing construction activities would be prohibited until a risk assessment is undertaken. The risk assessment would consider the likelihood and possible implications of the associated construction activities on the lek and set out necessary measures to ensure that no disturbance occurs. Restrictions to construction activity would likely be within two hours of dawn during the core lekking period of March to May, but the exact timing of restrictions and/or extent of any disturbance-free zone required until the core lekking period has passed, would be agreed with NatureScot. Furthermore, to minimise the possibility of disturbance outside these times to any leks within 750 m of access tracks, a maximum speed limit of 15 mph will be enforced, and personnel will remain within vehicles wherever possible. Where possible, gates within 750 m of lek sites will remain open after first arrival, therefore avoiding the need for every subsequent entry to open and close the gate and the associated potential disturbance to the lek due to pedestrian activity.
- 7.8.4 The ECoW will oversee the implementation of the above measures.

### Operation

- 7.8.5 No significant effects due to the operation of the Proposed Development were predicted, although a worst-case Moderate/minor adverse displacement effect was predicted for black grouse due to the proximity of the substation (and other infrastructure) to the historic lek site.
- 7.8.6 To address this potential reduction in habitat quality/availability, black grouse form a key consideration in the Outline Biodiversity Enhancement Management Plan (**Technical Appendix 6.6**). Planned enhancements that would benefit black grouse include:
- peatland enhancement, native woodland planting, bracken removal and restoration of calcareous grassland within Auchinreoch Glen SSSI, close to the historic lek (see Figure 6.11a). This would provide feeding, nesting and chick-rearing opportunities for black grouse throughout the year.

- expansion of native woodland coverage and increasing connectivity by tree planting along Murroch Glen and other gullies to the west of the lek site. This would provide food and shelter for black grouse, particularly in winter months.
- maintenance of the historic lekking area to retain its suitability. This may involve measures such as cutting of rushes/vegetation to retain a sward of preferred height and composition. New fencing within 1 km would be suitably marked to reduce collision risk. No tree planting would occur within 100 m of the lek site.

7.8.7 In addition, measures would be undertaken to minimise lighting and disturbance impacts associated with the operational substation. Options include provision of screening (opaque fencing or native tree/vegetation planting), minimisation of lighting requirements and timings, and directional lighting away from the lek site. Further details relating to substation design are provided in **Chapter 2: Proposed Development**.

## 7.9 Cumulative Effects

7.9.1 NatureScot (SNH 2018b) has provided guidance on assessing the cumulative effects on birds. Cumulative effects may arise when there are effects from two or more developments, including cumulative disturbance-displacement, collision mortality, habitat loss or barrier effects. Effects can be additive, antagonistic (i.e., the cumulative impact is less than the sum of the multiple individual effects) or synergistic (i.e., the cumulative impact is greater than the sum of the multiple individual effects).

7.9.2 The main projects likely to cause similar impacts on ornithological features are other operational wind farm developments, or those under construction, consented, or in the planning process, located within NHZ 17 or appropriate geographical reference area.

7.9.3 The assessment has predicted no significant effects due to the Proposed Development alone, particularly when embedded mitigation, additional mitigation and enhancement measures are considered. For all IOFs (osprey, goshawk and black grouse), there were no predicted losses or impacts on breeding pairs, or for black grouse, loss of lekking males, and so a quantitative cumulative assessment of disturbance-displacement effects is not possible, nor required.

7.9.4 The collision rates predicted for the three IOFs are very low (a collision being unlikely to occur during the operational period, see **Table 7.10**), and so the Proposed Development would contribute very little, if anything to the long-term cumulative collision effects on the NHZ 17 populations. As such, a cumulative assessment of collision risk can also be scoped out.

## 7.10 Summary of Residual Effects

7.10.1 For all IOFs, the predicted residual levels of significance of effects during the construction, operational and decommissioning stages of the Proposed Development are considered to be no more than of Moderate/Minor adverse and therefore Not Significant, when taking into consideration any required mitigation measures. The contribution of the Proposed Development to any cumulative effect would be negligible, particularly when mitigation and enhancement measures are implemented.

7.10.2 There are No Adverse Effects on the Integrity of any European Site predicted as a result of the Proposed Development, alone or in-combination with any other projects.

7.10.3 **Table 7.13** provides a summary of the effects detailed within this chapter.

**Table 7.13: Predicted Summary of Effects**

IOF	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
<b>Construction and Decommissioning Phases</b>				
Osprey	Habitat loss and disturbance	Minor adverse Not Significant	None required in addition to embedded mitigation (BBPP, ECoW, pre-construction surveys)	Minor adverse Not Significant
Goshawk		Minor adverse Not Significant		Minor adverse Not Significant
Black grouse		Moderate/Minor adverse Not Significant	BBPP would include specific restriction measures to avoid disturbance to any lekking birds.	Minor adverse Not Significant
<b>Operation Phase</b>				
Osprey	Displacement	Minor adverse Not Significant	None required.	Minor adverse Not Significant
	Collision Risk	Minor adverse Not Significant	None required.	Minor adverse Not Significant
	Lighting	Minor adverse Not Significant	None required.	Minor adverse Not Significant
Goshawk	Displacement	Minor adverse Not Significant	None required.	Minor adverse Not Significant
	Collision Risk	Minor adverse Not Significant	None required.	Minor adverse Not Significant
	Lighting	Minor adverse Not Significant	None required.	Minor adverse Not Significant
Black grouse	Displacement	Moderate/Minor adverse Not Significant	BEMP to maintain/ restore/ enhance habitat for black grouse. Screening and lighting limitations for substation.	Minor adverse Not Significant
	Collision Risk	Minor adverse Not Significant	Any new fencing or guy wires would be marked to reduce collision risks.	Minor adverse Not Significant
	Lighting	Minor adverse Not Significant	None required.	Minor adverse Not Significant



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