Technical Appendix 8.1: Ornithology Survey and Assessment Methodology

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8.1.1 Introduction

8.1.1.1 This Technical Appendix presents full details of the methodology for the ornithology field surveys conducted as part of the Environmental Impact Assessment undertaken for the Proposed Development, including references to best practice and impact assessment methodology. This TA should be read in conjunction with **Chapter 8 (EIAR Volume 2)** and **Chapter 3 (EIAR Volume 2)**.

8.1.2 Scope of Assessment

8.1.2.1 The scope of the assessment has been informed by consultation responses detailed in **Technical Appendix 1.2: Consultation Register (EIAR Volume 4)** and the legislation/policies/guidelines detailed in **Chapter 8: Ornithology (EIAR Volume 2).**

8.1.2.2 Best practice guidance has been implemented when undertaking field surveys as detailed below.

Extent of Study Area

8.1.2.3 The Ornithology Study Area comprises an Ornithology Desk Study Area (ODSA) and an Ornithology Field Survey Area (OFSA) as shown on **Figure 8.1 (EIAR Volume 3a); Figure 8.3** and **Figure 8.4a-c (EIAR Volume 3a)** respectively. The Desk Study Area included a 20 km buffer around the Proposed Development for Sites of International Importance and their qualifying ornithological features and a 10 km buffer around the Site for capercaillie *Tetrao urogallus.* This area is considered to represent the Zone of Influence (ZOI)[1] in which impacts on sensitive ornithological features from the Proposed Development could occur. The survey areas applied for different surveys varied as detailed below. The OFSA included the Site and a maximum of 2 km buffer on either side of the Site, depending on the survey type.

8.1.3 Methods of Baseline Data Collection

Desk Study

8.1.3.1 A desk study was undertaken to collect baseline data about the Proposed Development within the Ornithology Study Area, as defined above. The following ZOI were considered:

- all statutory designated sites up to 20 km from the Site, where bird features are qualifying features, including Special Protection Areas (SPA) and Ramsar sites;
- data purchased from the RSPB for western capercaillie Tetrao urogallus and Schedule 1 breeding raptors up to 10 km from the Site.
- data purchased from the HRSG for Schedule 1 breeding raptors up to 6km from the Site.

8.1.3.2 The results of the desk study are presented in **Figure 8.4: Desk Study Results (CONFIDENTIAL)**

Field Surveys 2023-2025

8.1.3.3 Field surveys included:

- Flight Activity Surveys;
- Moorland Breeding Bird Surveys;
- Breeding Raptor Surveys; and
- Black grouse *Lyrurus tetrix* Surveys.

Flight activity surveys – Vantage point surveys

8.1.3.4 A programme of Vantage Point (VP) surveys was proposed to develop an understanding of the flight patterns for the likely occurring bird species within the Ornithology Field Survey Area (defined as a 2 km buffer around the Site). VP locations were chosen following a desk-based exercise, conducted by Ramboll ornithologists experienced in developing and delivering bird surveys in Scotland. The number and locations of the proposed VPs were designed to provide optimal coverage, especially of open areas that have potential to be used by raptor species when hunting, displaying or using commuting routes, or to be used as commuting routes between upland lochs by migratory species and/or diver species.

8.1.3.5 Field surveys were undertaken by Redwing ecologists[2] between September 2023 and August 2025, inclusive.

8.1.3.6 The VP surveys initially consisted of undertaking watches at four VP locations, covering the OFSA. Additional VP surveys were undertaken from VP4 between August 2024 and August 2025 to provide optimal coverage for a potential golden eagle territory located within the OFSA. As far as possible, locations were identified where surveyors would be less visible during VP surveys, as well as during their approach to those locations and would therefore not disturb the bird species, potentially altering their behaviour.

8.1.3.7 The survey locations are shown on **Figure 8.2: Ornithology Flight Activity Survey Locations (EIAR Volume 3a)**.

8.1.3.8 Each survey location was surveyed twice per month, with each individual survey lasting three hours. This equates to 72 hours of annual survey time from each VP survey location, which is in line with NatureScot best practice guidance[3]. Survey timings were spread evenly across the day so surveys from the same location were not undertaken at the same time in adjacent months, potentially leading to a temporal bias in results. Surveys were only undertaken in favourable weather conditions, relative to the typical weather in the Scottish Highlands.

8.1.3.9 Target species included birds protected by wildlife legislation, such as the Schedule 1 of the Wildlife and Countryside Act 1981 and the list of species of conservation concern and local BAP species.

8.1.3.10 Standard VP flight recording as set out in best practice guidance was used[4]. Every five minutes, a scan for secondary species was completed, unless a target species was being watched, in which case the secondary species scan would not be completed, and the target species would be watched.

8.1.3.11 Flights were divided into 15 second intervals and each interval assigned a height band related to the Proposed Development. These height bands were as follows:

- Bands 1,2 – below collision risk height (0 – 20 m);
- Bands 2-4 – at collision risk height (20 – 200 m); and
- Band 5 – above collision risk height (200 m >).

[1] The area over which ecological features may be subject to significant effects as a result of the Proposed Development and its associated activities.

[2] While surveys were being undertaken Stagfire changed their operational name to Redwing Ecological Surveys

[3] NatureScot (2017) Guidance: Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. NatureScot, Battleby

[4] Ibid

Moorland Breeding Bird Surveys

8.1.3.12 Areas of moorland were surveyed using the Brown and Shepherd (1993)[5] methodology, within the Moorland Survey Area, including the Site and 500 m buffer. The Moorland Bird Survey Area was surveyed four times in 2024 between April and July, once each month, including the early breeding season (mid-April- and early May), the mid-breeding season (early-May), and the late breeding season (early June and mid-July). Surveys were conducted between 08:30 and 18:00 and surveyors walked through the Study Area to within at least 100 m of all parts of the Study Area. At regular intervals (approximately every 100 m) the surveyor scanned with binoculars as far as terrain or weather allowed and listened for calls or song. The location and activities of all species were recorded using standard British Trust for Ornithology (BTO) codes and notations, with the following criteria for assessing breeding status:

- presence of nest, eggs and/or young, seen or heard;
- birds seen carrying Faecal sac or Food to nest or young alarm calling indicative of nest, young or territory;
- adults entering or leaving nest-site, indications of occupied nest;
- displaying or singing male present;
- distraction display or injury feigning; and
- birds aggressively defending territories.

8.1.3.13 The following breeding statuses of the recorded species were established based on the survey results:

- Not breeding;
- Possible breeding;
- Probable breeding; and
- Confirmed breeding.

Breeding Raptor Surveys

8.1.3.14 Breeding raptor surveys were undertaken in April, May and June 2024. The survey area was visited twice per month. The survey area covered the Site and a 2 km buffer zone on either side. The surveyor identified areas of suitable breeding habitat for Annex 1 and Schedule 1 species which were monitored for activity. If breeding activity was located, intensive surveys were undertaken to confirm breeding success. The survey area and results are presented on **Figure 8.5: Breeding Raptor Survey Results (2024) CONFIDENTIAL (EIAR Volume 3a)**. The surveys were undertaken in accordance with the methodology set out in Hardey *et al.* (2013)[6].

Black grouse surveys

8.1.3.15 Black grouse surveys were undertaken in April and May 2024, including four visits per month, eight visits in total. The survey area comprised the Site and a 1.5 km buffer on either side. The survey methodology followed the guidance set out in Gilbert et al. (1998)[7]. The survey area and results are presented on **Figure 8.6: Black grouse Survey Results (2024) CONFIDENTIAL (EIAR Volume 3a)**.

Collision Risk Assessment

8.1.3.16 A Collision Risk Assessment (CRA) was undertaken following best practice NatureScot methodology[8]. This used the flight data gathered during the VP surveys to predict the level of collision mortality associated with the Proposed Development for each of the species assessed. Full details of this assessment are provided in **Technical Appendix 8.4: Collision Risk Assessment (EIAR Volume 4)**.

Golden Eagle Topography

8.1.3.17 Golden Eagle Topography (GET) Modelling is the NatureScot recommended model for predicting areas of significant use by territory-holding golden eagle and was developed based on the movements of satellite-tagged eagles. GET Modelling was undertaken covering the Ornithology Study Area. This provides an estimate of golden eagle activity for each location dependent on factors that have been preferential to golden eagles, following best practice guidance Fielding *et al* (2020)[9]:

- Slopes of greater than 10°;
- Altitude higher than 300 m; and
- Within 300 m of a ridge.

8.1.3.18 The output of this model has been used to predict areas of potentially higher golden eagle activity and is considered alongside the desk study and field survey data collected to inform the golden eagle baseline. All areas are scored on their suitability as golden eagle habitat, on a scale of 1 to 10 (10 most suitable, 1 least). The output of this model is shown in **Figure 8.7: Golden Eagle Topography (GET) Model CONFIDENTIAL**.

8.1.4 Assessment of impacts

8.1.4.1 The ornithological impact assessment has been completed following CIEEM Ecological Impact Assessment (EcIA) Guidelines (2019)[10].

Criteria for Evaluating Importance of Features

8.1.4.2 The ornithological features (designated sites, habitats, and species) identified have been assigned an ornithological importance using the guidance set out by CIEEM which refers to a geographic scale of importance. The classification of importance assesses ornithological features in relation to their population size, diversity, rarity, fragility, typicalness, connectivity with surroundings, intrinsic value, recorded history, and potential value. The outline of how the valuation of nature conservation features has been applied at different geographical scales and to different populations of species is presented in Table 8.1.1.

Table 8.1.1: Geographic Conservation Importance

Importance	Example
International	Internationally designated sites including Special Protection Area (SPA), Ramsar sites, potential SPAs and potential Ramsar sites; discrete areas which meet the published selection criteria for international designation, but which are not themselves designated as such, or smaller areas which are essential to maintain the viability of a larger whole. Important Bird Areas (IBA) are included here as

[5] A. F. Brown & K. B. Shepherd (1993) A method for censusing upland breeding waders, Bird Study, 40:3, 189-195, DOI: 10.1080/00063659309477182.

[6] Hardey, Crick, Wernham, Riley, Etheridge and Thompson (2013). Raptors: A field Guide for Surveys and Monitoring.

[7] Gilbert, Gibbons and Evans (1998). Bird Monitoring Methods: A Manual of Techniques for UK Key Species. Available at: https://cieem.net/resource/bird-monitoring-methods-a-manual-of-techniques-for-uk-key-species/ [accessed January 2026]

[8] https://www.nature.scot/doc/guidance-using-updated-collision-risk-model-assess-bird-collision-risk-onshore-wind-farms

[9] Fielding, A.H., Haworth, P.F., Anderson, D., Benn, S., Dennis, R., Weston, E. and Whitfield, D.P. (2020), A simple topographical model to predict Golden Eagle Aquila chrysaetos space use during dispersal. Ibis, 162: 400-415. https://doi.org/10.1111/ibi.12718 [accessed January 2026]

[10] CIEEM (2019) 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.

Table 8.1.1: Geographic Conservation Importance	
Importance	**Example**
	they are designations based on international population levels and trends though they are not statutory designations. Resident or regularly occurring populations of species which may be considered at an International/European level[1], the loss of which would adversely affect the conservation status or distribution of the species at an International/European level. Resident or regularly occurring populations that contribute >1% of the international (European or worldwide) population.
National	Nationally designated sites including Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Marine Nature Reserve; discrete areas which meet the published selection criteria for national designation, but which are not designated as such; or areas of habitat types identified in the UK Biodiversity Action Plan (BAP). Resident or regularly occurring populations of species which may be considered at the UK or National level[2], the loss of which would adversely affect the conservation status or distribution of the species across Britain or the Country. Resident or regularly occurring populations that contribute >1% of the national population.
Regional	Areas of a key habitat type identified in Regional BAPs; viable areas of key habitat identified as being of Regional importance in the appropriate Natural Heritage Zone (NHZ); or smaller areas of such habitat which are essential to maintain the viability of a larger whole. Resident or regularly occurring populations of species which may be considered at the Regional level, the loss of which would adversely affect the conservation status or distribution of the species across the Region. Resident or regularly occurring populations that contribute >1% of the regional population.
County	Designated sites at the local authority level in Scotland including statutory Local Nature Reserves and non-statutory Local Nature Conservation Sites; or discrete areas which meet the published selection criteria for designation, but which are not designated as such. Resident or regularly occurring populations of species which may be considered at the local authority level, the loss of which would adversely affect the conservation status or distribution of the species across the local authority area.
Local	A population of a species or assemblage considered locally important in the context of the immediate surrounding area. Resident or regularly occurring populations and supporting habitats of any bird species of conservation importance in the context of the immediate surrounding area.
Notes: [1]: Species protected at a European level means: bird species listed within the Birds Directive. [2]: Species protected, or which may be considered at the UK or National level means: birds listed within Wildlife and Countryside Act 1981 (as amended) Schedule 1 and / or listed for their principal importance for biodiversity in accordance with the Nature Conservation (Scotland) Act 2004 Section 2(4); species listed within the UKBAP or UK Red Data Books.	

8.1.4.3 A wide range of sources can be used to assign importance to ecological features, including legislation and policy. In the case of designated nature conservation sites, their importance reflects the geographic context of the designation. For example, sites designated as SPAs are recognised as being of importance at an international level. Ecological features not included in legislation and policy may also be assigned importance due to, for example, local rarity or decline, or provision of a functional role for other ecological features. Professional judgement is used to assign such importance.

Criteria for characterising impacts

8.1.4.4 The potential impacts upon ornithological features have been considered in relation to the Proposed Development. The impacts have been assessed without consideration of any specific mitigation measures that will be employed. The assessment of likely impacts has been made in relation to the baseline conditions of the Ornithology Field Survey Area. The likely impacts of development activities upon ornithological features have been characterised according to several variables detailed in Table 8.1.2.

Table 8.1.2: Impact characterisation	
Parameter	**Description**
Direction	Impacts are either adverse (negative) or beneficial (positive).
Magnitude	This is defined as high, medium, low or negligible, with these being classified using the following criteria: High: Total/near total loss of a bird population due to mortality or displacement or major reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Medium: Partial reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Low: Small but discernible reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Negligible: Very slight 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.
Extent	The geographical area over which an impact occurs.
Duration	The time for which the impact is expected to last prior to recovery of the feature or replacement of the feature by similar resource (in terms of quality and/or quantity). This is expressed as a short term, medium term, or long-term effect relative to the ornithological feature that is impacted.
Frequency	The number of times an activity occurs will influence the resulting effect. For example, a single person walking a dog would likely be a low magnitude impact on nearby waders using wetland habitat, but numerous walkers would subject the waders to frequent disturbance, which might be an impact of medium or even high magnitude and could affect feeding success, leading to displacement of the birds and knock-on effects on their ability to survive.
Timing	The timing of an activity or change. This may result in an impact if it coincides with critical life-stages or seasons e.g. bird nesting season.
Reversibility	Irreversible impacts: permanent changes from which recovery is not possible within a reasonable time scale or for which there is no reasonable chance of action being taken to reverse it. Reversible impact: temporary changes in which spontaneous recovery is possible or for which effective mitigation (avoidance/cancellation/reduction of effect) or compensation (offset/recompense/offer benefit) is possible.
Likelihood of impact	The likelihood of an impact occurring. The following convention, adapted from the Intergovernmental Panel on Climate Change (IPCC), is adopted: Virtually certain > 99% probability of occurrence Extremely likely 96 - 99% Very likely 91 - 95% Likely 67 - 90% More likely than not 51 - 66% Possible 34 - 50% Unlikely 11 - 33%

Table 8.1.2: Impact characterisation	
Parameter	**Description**
	Very unlikely 6 - 10% Extremely unlikely < 5% While not a parameter defined in the CIEEM Guidance, likelihood has been used in this assessment where the chances of an effect resulting could vary. The percentages quoted are to give context for each of the likelihoods defined. The evaluation of likelihood has been undertaken qualitatively based on experience and professional judgement.

8.1.4.5 The assessment only describes those characteristics relevant to understanding the ecological impact and determining the significance of the effect.

Cumulative Effects

8.1.4.6 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects are particularly important in EcIAs as many ecological features are already exposed to background levels of threat or pressure and may be close to critical thresholds, where further impacts could cause irreversible decline and significant cumulative effects. Further impacts can also make habitats and species more vulnerable or sensitive to change.

8.1.4.7 Developments included in the cumulative effects assessment are the following types of future development within the same ZoI:

- Proposals for which consent has been applied;
- Projects that have been granted consent but have not yet been started or have been started but are not yet completed (i.e. under construction);
- Proposals that have been refused permission but are subject to appeal; and
- To the extent that their details are in the public domains, proposed projects that will be implemented by a public body but for which no consent is needed from a competent authority.

8.1.4.8 It may also be necessary to consider developments that are operational but whose full environmental effects are not yet known and cannot be accounted for in the baseline.

Magnitude of Impact

8.1.4.9 Detailed consideration of impact magnitude is a standard component of ecological impact assessment. It is incorporated to succinctly describe the scale of individual impacts. The magnitude of effects is predicted quantitatively where possible, taking into account the duration and reversibility of effects, and is considered spatially and temporally as described within Table 8.1.3. Effects can be adverse, neutral or beneficial.

Table 8.1.3: Description of spatial impact magnitudes	
Spatial impact magnitude	**Description**
High	Major effect on the nature conservation status of the Site, habitats or species, likely to threaten the long-term integrity of the system.
Medium	Moderate effect on the nature conservation status of the Site, habitats or species, but would not threaten the long-term integrity of the system.

Table 8.1.3: Description of spatial impact magnitudes	
Spatial impact magnitude	**Description**
Low	Noticeable effects, but either of sufficiently small scale or short duration to cause no harm to the conservation status of the Site, habitats or species.
Negligible	Not expected to affect the conservation status of the Site, habitats or species under consideration in any way, therefore no noticeable effects on the ecological resource.

Significance Criteria

8.1.4.10 Significant effects are assessed with reference to the geographic importance of the ecological feature. However, the scale of significance of an effect may not be the same as the geographic context in which the feature is not considered important. For example, a significant effect on a species protected by national legislation does not necessarily equate to a significant effect on its national population.

8.1.4.11 For the purposes of this ecological impact assessment, apart from in exceptional circumstances, a significant effect, as defined by the Electricity Works (Environment Impact Assessment) (Scotland) Regulations 2017[11] is only considered to be possible where the feature in question is considered to be of regional, national or international importance. That is not to say that impacts from the Proposed Development could not result in significant effects on features of county or local importance, simply that those effects are not likely to be significant under EIA Regulations, unless the effect is likely to undermine biodiversity conservation objectives (such as local polices for no net loss) or biodiversity in general. Whether an effect at local or county importance is considered to be significant or not significant under the EIA Regulations is made clear in the impact assessment of each ecological feature.

8.1.4.12 Table 8.1.4 illustrates how residual effects are determined by comparison of the sensitivity of receptors with the magnitude of predicted change. For the purposes of this assessment significant effects are major or major/moderate.

Table 8.1.4: Significance Criteria	
Spatial impact magnitude	**Description**
Major	This is a significant effect (either beneficial or adverse), as the effect is likely to result in a long-term significant effect on the integrity of the receptor at a particular geographical scale.
Moderate	This is a potentially significant effect (either beneficial or adverse), as the effect is likely to result in a medium term or partially significant effect on the integrity of the receptor at a particular geographical scale.
Minor	The effect is likely to affect the receptor at an insignificant level by virtue of its limited duration and/or extent, but there will probably be no effect on its integrity. This is not a significant effect.
Negligible	No discernible effect is expected as a result of the Proposed Development.

[11] The Electricity Works (Environmental Impact Assessment) (Scotland) Act (2017), URL: http://www.legislation.gov.uk/ssi/2017/101/contents/made [Accessed 10/01/2025].