

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	D. Jordan	10/07/2024
0.2	Reviewed	S. Sanders	17/07/2024
0.3	Updated	D. Jordan	18/12/2024
1	Internal Approval	S. Sanders	06/01/2025

Blair Hill Wind Farm  
Ornithology  
Technical Appendix 9.1

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## 1 INTRODUCTION

MacArthur Green was commissioned by RES to complete ornithological surveys at the proposed Blair Hill Wind Farm (hereafter referred to as ‘the Proposed Development’), approximately 2.2 km north of the town of Newton Stewart and approximately 2.4 km east of the River Cree in Dumfries and Galloway. The surveys were conducted between April 2022 and July 2024 to inform an assessment of the potential ornithological effects of the Proposed Development on the species assemblage present.

This technical report summarises the methods employed and the results of the field surveys and is supported by the following Annexes.

- **Annex A:** Ornithological Legal Protection;
- **Annex B:** Ornithological Survey Methodologies;
- **Annex C:** Ornithological Survey Effort and General Information;
- **Annex D:** Ornithological Survey Results; and
- **Annex E:** Collision Risk Assessments.

Confidential information relating to species listed on Annex 1 of the EU Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) is detailed in **Confidential Technical Appendix 9.2**.

A range of surveys were employed to accurately record baseline conditions within the Proposed Development and appropriate survey areas (detailed in **Annex B**). In this Technical Appendix, associated **Annexes A – E**, **Confidential Technical Appendix 9.2** and **Chapter 9 (Ornithology)** of the Environmental Impact Assessment Report, terms are referred to as follows:

- ‘the Site’ refers to the area within the Site boundary, e.g. **Figure 9.1**;
- ‘survey area’ is defined as the area covered by each survey type for the Proposed Development; and
- ‘study area’ is defined as the area of consideration of effects on each species at the time of assessment (**Figure 9.1**).

## 2 LEGAL PROTECTION

With limited exceptions, all wild birds and their eggs are protected by law. Specific levels of protection are determined by a species’ inclusion on certain lists. **Annex A** to this report details the various levels of legal protection afforded to UK bird species.

## 3 FIELD SURVEY METHODS

The following surveys were undertaken at the Site between April 2022 and July 2024:

- Flight activity surveys (two breeding seasons and two non-breeding seasons), from four Vantage Points (VPs) in Year 1 (April 2022 – March 2023, **Figure 9.3**) and five VPs in Year 2 (March 2023 – March 2024, **Figure 9.4**);
- Scarce breeding bird surveys (main Site: two breeding seasons, access track: one breeding season), 2 km/800 m survey buffer (main Site/access track), **Figure 9.5**;
- Black grouse surveys (main Site: two breeding seasons), 1.5 km/800 m survey buffer (main Site/access track), **Figure 9.6**;
- Breeding bird surveys (main Site: two breeding seasons), 500 m survey buffer, **Figure 9.7**; and
- Winter walkover surveys (main Site: two non-breeding seasons), 500 m survey buffer, **Figure 9.7**.

Survey methods followed the recommended NatureScot (SNH 2017<sup>i</sup>) guidelines available at the time and methods are described in detail within **Annex B**. Where possible, each survey was carried out beyond the Site within a buffer distance specific to that method (e.g. 2 km buffer for the scarce breeding bird surveys) and these are detailed within **Annex B**.

A target species list for survey/recording was defined from the following lists and refined on the basis of the species perceived sensitivity to onshore wind farm developments (e.g., as set out in Annex 1 of NatureScot guidance, SNH 2018<sup>ii</sup>).

- Annex 1 of the EU Birds Directive;
- Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); and
- Species included on the Birds of Conservation Concern (BoCC) red list (Stanbury *et al.* 2022<sup>iii</sup>).

Secondary species for survey/recording were defined as the non-red list<sup>iii</sup> raptor and owl species (i.e. buzzard, kestrel, sparrowhawk, tawny owl and long-eared owl), gulls (excluding herring gull), amber and green listed<sup>iii</sup> waders, feral species (e.g., canada goose), mallard, raven and any large concentrations of/regionally common Schedule 1 or red listed<sup>iii</sup> passerine species as noted to be present during surveys.

## 4 FIELD SURVEY RESULTS

All valid surveys were undertaken during suitable weather conditions (as described within **Annex B**). Where weather conditions deteriorated below acceptable conditions (see definitions in **Annex B**), surveys were either suspended or additional surveys were undertaken. In the case of flight activity surveys, any time where the visibility was <1 km was excluded from total survey effort and subsequent analysis (further detail in **section 4.1**). Schedule 1/Annex 1 surveys were carried out by appropriately licensed surveyors. All survey data were reviewed, inputted, and analysed by MacArthur Green.

A total 82 bird species were recorded within, or adjacent to, the Site during the various ornithological surveys conducted. Survey effort and results of the field surveys are detailed within **Annex C** and **Annex D**. The following sections summarise the results from each survey undertaken.

#### 4.1 Flight Activity

Flight activity surveys across the 2022 and 2023 breeding seasons and 2022/2023 and 2023/2024 non-breeding seasons were undertaken across four and five VPs during year 1 and year 2 respectively. Valid survey effort<sup>1</sup> is detailed in **Table 9-1-1** and full details of flight activity surveys are contained in **Annex C** with methodology in **Annex B**.

**Table 9-1-1 Summary of total hours of valid survey per VP in each season**

Period	VP1	VP2	VP3	VP4	VP5	VP6	VP7	VP8	VP9
2022 breeding season	36	44	28	36	-	-	-	-	-
2022/2023 non-breeding season	36	36	36	36	-	-	-	-	-
2023 breeding season	-	-	-	-	36	36	36	36	36
2023/2024 non-breeding season	-	-	-	-	36	36	36	36	36

A total of 12 target species were recorded during the flight activity surveys (further details are provided in **Annex D**). For each species across the whole flight activity survey period, **Table 9-1-2** shows the total number of flights recorded and the total number of birds recorded<sup>2</sup>. The bird seconds are calculated for each observation as the product of flight duration and number of individuals. This is then summed per species to give the total bird seconds recorded across the entire surveyed period.

**Table 9-1-2 Target species recorded and total number of flights recorded during flight activity surveys, 2022-2024**

Species	Total number of flightlines recorded	Total number of birds recorded	Total bird seconds recorded
Black grouse	1	3	45
Curlew	1	1	60
Golden plover	2	28	4,060
Goshawk	2	2	48
Greylag goose	1	3	102
Hen harrier	12	12	746
Herring gull	1	4	420
Lapwing	1	5	660
Merlin	9	9	368
Peregrine falcon	1	1	120
Pink-footed goose	1	27	1,404
Red kite	49	55	5,038

<sup>1</sup> Hours where visibility was >1 km are not considered valid for use in collision risk modelling as less than half the 2 km viewshed can be seen.

<sup>2</sup> This includes flights that would not technically be 'at-risk' of collision (e.g. recorded outwith the CRAA and/or not at rotor height).

<sup>3</sup> In some cases, only part of a total flight duration was recorded at PCH, and it is assumed that this proportion is applicable for that part of the flight within the CRAA and 2 km viewshed area.

#### 4.1.1 Flightlines Used in Collision Risk Modelling

Only flightlines identified to be within the Collision Risk Analysis Area (CRAA) and recorded within the 2 km viewshed of the associated VP were considered in the collision risk modelling and **Annex E** provides details of the bird seconds from flights identified to be 'at-risk'.

- 'At-risk' is defined as – a flight having at least part of its duration (i) at Potential Collision Height (PCH)<sup>3</sup>; (ii) within the CRAA; and (iii) recorded within the 2 km viewshed of the associated VP.
- PCH is defined as – the altitude between the minimum and maximum blade height<sup>4</sup> (taken to be from 80 m to 250 m for the Proposed Development).

Black grouse and goshawk were recorded during flight activity surveys, but no flights were considered to be 'at-risk'<sup>5</sup>. Full survey results detailing the findings from each survey visit (including target species' flightlines considered not 'at-risk' and secondary species information) can be found within **Annex D**. Only bird seconds for observations identified as within the CRAA and associated viewshed are considered in the following discussions. Full target species results are detailed within **Annex D** and the collision risk calculations are detailed in **Annex E**.

#### 4.1.2 Collision Risk Model Outputs

The bird seconds for target species flights identified to be 'at-risk' were then input into a Collision Risk Model (CRM) to calculate the predicted collision rates per season. The CRM calculations for each species can be found in **Annex E. Table 9-1-3** and

<sup>4</sup> Where the actual rotor blade altitude differs from the pre-defined survey height bands, the collision risk model accounts for this difference on the assumption of an even flight distribution within each particular survey height band, and an adjustment can be made to estimate total flight duration at actual rotor blade altitude.

<sup>5</sup> i.e. the flights were either not within the CRAA and associated viewshed or were only recorded flying above 150m.

Table 9-1-4 provide the estimated collision rates and number of seasons per collision for each species.

**Table 9-1-3 Estimated collision rates**

Species	2022 breeding season	2022/2023 non-breeding season	2023 breeding season	2023/2024 non-breeding season	Mean breeding	Mean non-breeding	Mean annual
Curlew	0	0.0006	0	0	n/a	0.0003	0.0003
Golden plover	0.0043	0	0	0	0.0021	n/a	0.0021
Greylag goose	0	0.0017	0	0	n/a	0.0008	0.0008
Hen harrier	0	0	0	0.0005	n/a	0.0002	0.0002
Herring gull	0	0	0.0232	0	0.0116	n/a	0.0116
Lapwing	0	0.0069	0	0	n/a	0.0034	0.0034
Merlin	0	0	0.0002	0	0.0001	n/a	0.0001
Peregrine falcon	0	0	0	0.0017	n/a	0.0008	0.0008
Pink-footed goose	0	0	0	0.0349	n/a	0.0174	0.0174
Red kite	0.0293	0.0031	0.0303	0.0069	0.0298	0.0050	0.0348

**Table 9-1-4 Estimated number of seasons per collision**

Species	2022 breeding season	2022/2023 non-breeding season	2023 breeding season	2023-2024 non-breeding season	Mean breeding	Mean non-breeding	Mean annual
Curlew		1,628			-	3,256	3,256
Golden plover	234				469	-	469
Greylag goose		597			-	1,195	1,195
Hen harrier				2,053	-	4,107	4,107
Herring gull			43.2		86	-	86
Lapwing		146			-	291	291
Merlin		-	4,288		8,576	-	8,576
Peregrine falcon				594	-	1,187	1,187
Pink-footed goose				28.7	-	57	57
Red kite	34.1	323	33	146	33.6	201	28.8

#### 4.2 Breeding Birds

Two complete breeding bird surveys (comprising of four visits each) were undertaken in 2022 and 2023 (April to July). Surveys recorded one wader species which was considered to be breeding (**Table 9-1-5**). Golden plover were also recorded but were not considered to be breeding. Full details of the breeding bird surveys are provided within **Annex C** and **Annex D** and survey methodology is provided within **Annex B**.

**Table 9-1-5 Breeding wader territories, 2022 and 2023 (number of territories within the 500 m study area shown in (brackets))**

Species	Number of territories 2022	Number of territories 2023
Snipe	14-15 (4)	4-9 (2)

#### 4.3 Winter Walkover

Winter walkover surveys were undertaken during the 2022/2023 and 2023/2024 non-breeding seasons. Surveys recorded 34 species of which three are considered to be target species (**Table 9-1-6**). Full details of the winter walkover surveys are provided within **Annex C** and **Annex D** and survey methodology is provided within **Annex B**.

**Table 9-1-6 Winter walkover: target species records (number of birds recorded per visit), 2022 to 2024**

Species	2022/2023 non-breeding season		2023/2024 non-breeding season	
	Number of records	Total number of birds	Number of records	Total number of birds
Golden eagle	-	-	1	1
Goshawk	-	-	1	1
Red kite	2	2	2	2

<sup>i</sup> Scottish Natural Heritage (2014; updated 2017) Recommended Bird Survey Methods to inform impact assessment of Onshore Windfarms.

<sup>ii</sup> Scottish Natural Heritage (2018) Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas.

#### 4.4 Scarce Breeding Birds

Scarce breeding bird surveys were undertaken during the 2022 (April to August), 2023 (March to August) and 2024 (March to July) breeding seasons. Note that the surveys during the 2024 breeding season were focussed along the proposed access track.

Barn owl were confirmed to be breeding within the survey area and breeding activity is summarised in **Table 9-1-7** with full details of breeding activity provided in **Confidential Technical Appendix 9.2**.

**Table 9-1-7 Scarce breeding bird summary**

Species	2022	2023	2024
Barn owl	One pair confirmed breeding, another possible nest location identified. One young found dead late in the season; unknown if any others fledged.	Confirmed breeding. Success unknown.	No barn owl breeding/roosting within access track survey area.

Golden eagle, goshawk, hen harrier, merlin and red kite (target raptor species) were recorded during surveys (**Annex D**) but were not identified to be breeding. Buzzard, kestrel and sparrowhawk (secondary raptor species) were also recorded across the survey area and are likely to have bred within the wider area.

Full details of the scarce breeding bird surveys are provided within **Annex C** and **Annex D** and **Confidential Technical Appendix 9.2** and survey methodology is provided within **Annex B**.

#### 4.5 Black Grouse

Surveys to identify areas of black grouse activity, locate lek locations and establish lek size were undertaken during the 2022, 2023 and 2024 breeding seasons during April and May (note that the surveys during the 2024 breeding season were focussed along the proposed access track.). Surveys identified two lek locations, with lek 2 recording the largest number of lekking males in 2024 (**Table 9-1-8**). Full details of the black grouse surveys are provided within **Annex C** and **Annex D** and survey methodology is provided within **Annex B**.

**Table 9-1-8 Black grouse lek activity: 2022 to 2024**

Lek	Location	2022	2023	2024	Maximum number of males recorded	Maximum number of females recorded
		Maximum number of males recorded	Maximum number of males recorded	Maximum number of males recorded		
1	Coldstream Burn	1	0	2	0	Outwith 2024 survey area
2	Benera (hill)	Outwith 2024 survey area	Outwith 2024 survey area	1	0	3

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