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Breezy Hill Energy Project
Ornithology
Appendix 7.1

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1 INTRODUCTION

MacArthur Green was commissioned by Brockwell Energy to complete ornithological surveys at the proposed Breezy Hill Energy Project, north of Dalmellington in East Ayrshire (hereafter referred to as 'the Proposed Development'). The surveys were conducted between April 2020 and August 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 Appendix 7.2.

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 7.2 and Chapter 7 (Ornithology) of the Environmental Impact Assessment Report. Terms referred to are as follows:

- 'the Site' refers to the area within the red line boundary, e.g. Figure 7.1;
- '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 7.1).

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 2020 and August 2024:

- Flight activity surveys (two breeding seasons and two non-breeding seasons), from between two and three vantage points (VPs) depending on the season (see EIA Figure 7.3);
- Winter walkover surveys (two non-breeding seasons), 500 m survey buffer;
- Scarce breeding bird surveys (three breeding seasons), 2 km survey buffer; and
- Black grouse surveys (three breeding seasons), 1.5 km survey buffer.

Survey methods followed the recommended NatureScot (SNH 2017ⁱ) 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 surveying/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 SNH 2018ⁱⁱ).

- Annex I of the EU Birds Directiveⁱⁱⁱ;
- Schedule 1 the Wildlife and Countryside Act 1981 (as amended)^{iv}; and
- Species included on the Birds of Conservation Concern (BoCC) red list (Stanbury *et al.* 2022^v).

Secondary species for survey/recording were defined as the non-red list raptor and owl species (i.e. buzzard, kestrel, sparrowhawk, tawny owl and long-eared owl), gulls (excluding herring gull), amber or green listed waders, feral species (e.g. Canada goose), mallard, raven and any large concentrations of regionally common Schedule 1 or red listed 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 of 101 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

The flight activity surveys recorded all target species’ flight activity within the Site and beyond. These data have been used in the collision risk modelling. The flights used included those within the ‘Collision Risk Analysis Area’ (CRAA) (i.e. the area to be occupied by operational turbines, together with a 500 m buffer).

Flight activity surveys across the 2020, 2021 and 2024 breeding seasons and 2020/2021, 2021/2022 and 2024 non-breeding seasons were undertaken between two and three VPs. Valid survey effort¹ is detailed in Table 7-1-1 and full details of flight activity surveys are contained in Annex C with methodology in Annex B.

Table 7-1-1 Summary of total hours of valid survey per VP in each season

Period	VP1	VP2	VP3
2020 breeding season	36	45	-
2020/2021 non-breeding season	41	45	48
2021 breeding season	36	36	45
2021/2022 non-breeding season	41	36.5	36.08

A total of ten 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 7-1-2 shows the total number of flights recorded and the total number of birds recorded². 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 7-1-2 Target species recorded and total number of flights recorded during flight activity surveys, 2020-2024

Species	Total number of flightlines recorded	Total number of birds recorded	Total bird seconds recorded
Curlew	4	4	164
Golden plover	4	14	751
Goshawk	16	16	872
Hen harrier	2	2	110
Herring gull	3	3	63
Hobby	1	1	120
Merlin	1	1	20
Osprey	4	4	124
Peregrine falcon	4	4	145
Whooper swan	1	2	12

4.1.1 Flightlines Used in Collision Risk Modelling

Only flightlines identified to be within the 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)³; (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 height⁴ (taken to be from 13.9 m to 149.9 m for the Proposed Development).

Whooper swan were recorded during flight activity surveys but no flights were considered to be ‘at-risk’⁵. 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 within the CRAA at PCH 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 7-1-3 and Table 7-1-4 provide the estimated collision rates and number of seasons per collision for each species.

Table 7-1-3 Estimated collision rates

Species	2020 breeding season	2020/2021 non-breeding season	2021 breeding season	2021/2022 non-breeding season	Mean breeding	Mean non-breeding	Mean annual
Curlew	0.0275	-	-	0.0115	0.0137	0.0057	0.0195
Golden plover	-	0.0037	-	0.0708	-	0.0373	0.0373
Goshawk	0.0354	0.0096	0.0325	0.0058	0.0339	0.0077	0.0416
Hen harrier	-	-	-	0.0036	-	0.0018	0.0018
Herring gull	-	-	0.0001	-	0.0001	-	0.0001
Hobby	-	-	0.0042	-	0.0021	-	0.0021
Merlin	-	0.0007	-	-	-	0.0004	0.0004
Osprey	-	-	0.0055	-	0.0028	-	0.0028
Peregrine falcon	0.0023	-	0.0004	0.0032	0.0014	0.0016	0.0030

Table 7-1-4 Estimated number of seasons per collision

Species	2020 breeding season	2020/2021 breeding season	2021 breeding season	2021/2022 non-breeding season	Mean breeding	Mean non-breeding	Mean annual
Curlew	36.37			87.30	72.7	175	51.3
Golden plover		268		14.13	-	26.8	26.8
Goshawk	28.28	105	30.80	173	29.5	130	24.0
Hen harrier				280	-	561	561
Herring gull			6775		13550	-	13550

¹ 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.
² This includes flights that would not technically be ‘at-risk’ of collision (e.g. recorded outwith the CRAA and/or not at rotor height).
³ 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 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.
⁵ i.e. the flights were either not within the CRAA and associated viewshed or were only recorded flying above 150m.

Species	2020 breeding season	2020/2021 breeding season	2021 breeding season	2021/2022 non-breeding season	Mean breeding	Mean non-breeding	Mean annual
Hobby			239		478	-	478
Merlin		1335			-	2670	2670
Osprey			180		361	-	361
Peregrine falcon	431		2298	311	726	623	335

4.2 Breeding Birds

Upland breeding wader species were not a focus of the surveys, as the Site is mostly comprised of unsuitable habitat (a mixture of plantation and former opencast mining areas). Common sandpiper, ringed plover and snipe were identified to be breeding around the Gibson’s Hill loch. Full details of upland breeding wader species recorded are provided within Annex D.

4.3 Winter Walkover

Winter walkover surveys were conducted during the 2020/2021 and 2021/2022 non-breeding seasons. Surveys recorded the following target species (Table 7-1-5). Full details of the winter walkover surveys are provided within Annex C and Annex D and survey methodology is provided within Annex B.

Table 7-1-5 Winter walkover: target species records (number of birds recorded per visit), 2020 to 2022

Species	2020/2021 non-breeding season		2021/2022 non-breeding season	
	Number of records	Total number of birds	Number of records	Total number of birds
Golden plover	-	-	2	92
Goshawk	2	2	1	1
Merlin	1	1	1	1
Peregrine falcon	2	2	1	1
Ringed plover	-	-	1	2

4.4 Scarce Breeding Birds

Scarce breeding bird surveys were conducted during the 2020 (April to August), 2021 (March to August) and 2024 (March to August) breeding seasons.

ⁱ Scottish Natural Heritage (2014; updated 2017) Recommended Bird Survey Methods to inform impact assessment of Onshore Windfarms.
ⁱⁱ Scottish Natural Heritage (2018) Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas.
ⁱⁱⁱ Directive 2009/147/EC of the European Parliament and of the Council. Available at: <https://www.legislation.gov.uk/eudr/2009/147/contents>

Goshawk, osprey and peregrine falcon were all identified to be breeding/potentially breeding within the survey area and breeding activity is summarised in Table 7-1-6. Confidential Technical Appendix 7.2 contains the full details of all breeding activity. Hen harrier, hobby and merlin were also recorded during surveys but were not considered to be breeding/no breeding attempts were located.

Table 7-1-6 Scarce breeding bird summary

Species	2020	2021	2024
Goshawk	N/A	N/A	Potential territory, breeding activity unconfirmed
Osprey	N/A	N/A	One territory; two young fledged.
Peregrine falcon	N/A	One territory; breeding success unknown.	N/A

Buzzard, kestrel, sparrowhawk and tawny owl (secondary raptor and owl 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 7.2 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 conducted in the 2020, 2021 and 2024 breeding seasons during April, May and June. Surveys identified three lek locations with lek 3 recording the largest numbers in 2020 (Table 7-1-7). Full details of the black grouse surveys are provided within Annex C and Annex D and survey methodology is provided within Annex B.

Table 7-1-7 Black grouse lek activity: 2020 to 2024

Lek	Location	2020		2021		2024	
		Maximum number of males recorded	Maximum number of females recorded	Maximum number of males recorded	Maximum number of females recorded	Maximum number of males recorded	Maximum number of females recorded
3	NS 496 104	2	-	-	-	-	-
4	NS 477 093	1	-	-	-	-	-
6	NS 493 095	1	-	-	-	-	-

^{iv} Scottish Government (1981). Wildlife and Countryside Act 1981. Available at: <https://www.legislation.gov.uk/ukpga/1981/69>
^v 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