



HAGSHAW HILL WIND FARM REPOWERING
ORNITHOLOGY
Appendix 8.1

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1 INTRODUCTION

MacArthur Green was commissioned by Hagshaw Hill Repowering Ltd to complete ornithological surveys at the proposed Hagshaw Hill Wind Farm Repowering site, near Douglas in South Lanarkshire (hereafter referred to as the 'Proposed Development' and the 'site'). The surveys were conducted between March and August 2018 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 Methodology;
Annex C:	Ornithological Survey Effort and General Information;
Annex D:	Ornithological Survey Results;
Annex E:	Collision Risk Assessments;
Annex F:	Review of the Effects of Artificial Light on Birds in Relation to Deployment of Obstruction Lighting on Wind Turbines; and
Annex G:	Supplementary Desk Study Information.

A range of surveys were employed to accurately record baseline conditions within the site and appropriate survey buffers (detailed in Annex B). In this Technical Appendix, associated Annexes (A – E) and Chapter 8 (Ornithology) of the Environmental Impact Assessment (EIA) Report, terms referred to are as follows:

- the site refers to the area within the red line boundary (**Figure 8.3**);
- 'survey area' is defined as the area covered by each survey type at the time of survey (**Figure 8.3**, refer to Annex B for details of various survey buffers); and
- 'study area' is defined as the area of consideration of effects on each species at the time of assessment (**Figure 8.3**).

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 March and August 2018:

- Flight activity surveys (one breeding season), from one vantage point;
- Breeding bird surveys (one breeding season), within a 500m survey buffer;
- Scarce breeding bird surveys (one breeding season), within a 2km survey buffer; and

- Black grouse surveys (one breeding season), within a 1.5km survey buffer.

Survey methods followed the recommended SNH (2017¹) 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. 2km buffer for the scarce breeding bird surveys) and these are detailed within Annex B.

The relative importance of the data collected was determined by the specific level of protection assigned to those species recorded, coupled with their perceived susceptibility to potential impacts resulting from the Proposed Development. The resulting 'target species' and 'secondary species' lists are a standard assessment tool for wind farm ornithological studies (see Annex B).

4 FIELD SURVEY RESULTS

All surveys were undertaken during suitable weather conditions (as described within Annex B – Survey Methodologies). Where weather conditions deteriorated below acceptable conditions (Annex B), surveys were either suspended or additional surveys were undertaken. In the case of flight activity surveys, any time where the visibility was <1km 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.

Survey effort and results of the field surveys are detailed within Annexes C & D and survey results are also illustrated within **Figure 8.5**. 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 considered for inclusion in the collision risk modelling. The flights used in the model were those within the 'Collision Risk Analysis Area' (CRAA) (i.e. the area to be occupied by operational turbines, together with a 250m buffer to account for any surveyor inaccuracies).

Flight activity surveys across the 2018 breeding season were undertaken from one Vantage Point (VP) (**Figure 8.4**). A total of 34 hours of valid survey effort² were undertaken and full details of flight activity surveys are contained in Annex C with methodology in Annex B.

A total of six target species were recorded during the flight activity surveys (**Figure 8.5** presents observed flightlines and further details are provided in Annex D). For each species across the whole flight activity survey period, Table 8-1 details the number of flights recorded and the number of birds recorded³. 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.

¹ Scottish Natural Heritage (2017) Recommended Bird Survey Methods to inform impact assessment of Onshore Windfarms.

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

³ This includes flights that would not technically be 'at-risk' of collision (e.g. recorded outwith the CRAA and/or not at rotor height).

Table 8-1 Target species recorded and total number of flights recorded during flight activity surveys, 2018

Species	Total number of flightlines recorded	Total number of birds recorded	Total bird seconds recorded*
Curlew	9	13	729
Golden plover	2	154	34,144
Herring gull	1	1	28
Lapwing	1	2	50
Osprey	1	1	90
Oystercatcher	1	1	32

*= flight duration x number of birds in flock

4.1.1 Flightlines Used in Collision Risk Modelling

Only flightlines identified to be within the CRAA and recorded within the 2km 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)⁴; (ii) within the CRAA; and (iii) recorded within the 2 km viewshed of the associated VP.
- PCH is defined as – the altitude between the lower and upper rotor tip height⁵ (in this case between 45m and 200m).

Curlew, herring gull and oystercatcher were recorded during flight activity surveys but no flights were 'at-risk'⁶. 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 8-2 provides the estimated collision rates and Table 8-3 the number of seasons per collision for each species.

Table 8-2 Estimated collision rate per species

Species	Collision rate
Golden plover (spring migration)	3.391
Lapwing (breeding)	0.030
Osprey (breeding)	0.015

⁴ 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 2km viewshed area.

⁵ 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.

⁶ i.e. the flights were either not within the CRAA and associated viewshed or were only recorded flying above PCH.

Table 8-3 Estimated number of seasons per collision

Species	Collision rate
Golden plover (spring migration)	0.29
Lapwing (breeding)	32.97
Osprey (breeding)	64.87

4.2 Breeding Birds

One complete breeding bird survey (comprising of four visits) was conducted in the 2018 breeding season (April to July 2018). Surveys recorded five wader species of which three were considered to be breeding (Table 8-4, wader activity is detailed on **Figure 8.6**). Full details of the breeding bird surveys are provided within Annexes C and D and survey methodology is provided within Annex B.

Table 8-4 Breeding wader territories, 2018 – (additional territories outwith the 500m study area)

Species	Number of territories
Common sandpiper	0 (1)
Curlew	1 (2)
Oystercatcher	0
Ringed plover	0
Snipe	3 (2)

4.3 Scarce Breeding Birds

Scarce breeding bird surveys were conducted during the 2018 (March to August) breeding season.

Peregrine was recorded in flight on two occasions during surveys (**Figure 8.7**), but no breeding attempts were located within the survey area.

On one survey in late August, a juvenile merlin was present within the site, but the species was absent apart from on this survey, and the observations are likely to represent a dispersing bird rather than a local breeder. On the same survey a male hen harrier and an osprey were recorded, also likely dispersing from breeding grounds elsewhere.

Buzzard, kestrel, sparrowhawk and tawny owl (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 Annexes C and D, and survey methodology is provided within Annex B.

4.4 Black Grouse

Surveys to identify areas of black grouse activity, locate lek locations and establish lek size were conducted in the 2018 breeding season during April and May. No black grouse leks or black grouse themselves were recorded during targeted surveys (nor during any other surveys during the 2018 breeding season). Full details of the black grouse surveys are provided within Annex C and survey methodology is provided within Annex B.