Cloud Hill Wind Farm

Technical Appendix 8.1 Ornithology

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Ornithology
Appendix 8.1

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CONTENTS

1. INTRODUCTION

MacArthur Green was commissioned by Cloud Hill Windfarm to complete ornithological surveys at the proposed Cloud Hill Wind Farm, Sanquhar in Dumfries & Galloway as described in Chapter 4 of the EIA Report and shown edged red on Figure 3.2d (hereafter referred to as 'the Proposed Development'). The surveys were conducted between March 2018 and March 2020 to inform an assessment of the potential ornithological effects of the 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 & General Information
Annex D	Ornithological Survey Results
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 8.2**.

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 8.2** and **Chapter 8 (Ornithology)** of the EIA Report. Terms referred to are as follows:

- 'the Site' refers to the area within the red line boundary, e.g. Figure 8.3 and Figure 3.2d;
- '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.

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 2018 and March 2020:

- Flight activity surveys (2 breeding seasons and 2 non-breeding seasons), from 2 vantage points (VPs) (**Figure 8.1**);
- Breeding bird surveys (2 breeding seasons), 500 m survey buffer;
- Winter walkover surveys (2 non-breeding seasons), 500 m survey buffer;
- Scarce breeding bird surveys (2 breeding seasons), 2 km survey buffer; and

- Black grouse surveys (2 breeding seasons), 1.5 km survey buffer.

Survey methods followed the recommended NatureScot guidance (SNH 2017[i]) 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**.

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 effects 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 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 89 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 **Annexes C and 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 2018 and 2019 breeding seasons and 2018/2019 and 2019/2020 non-breeding seasons were undertaken from two Vantage Points (VPs, **Figure 8.1**). Valid survey effort[1] is detailed in **Table 8-1-1** and full details of flight activity surveys are contained in **Annex C** with methodology in **Annex B**.

Table 8-1-1 Summary of total hours of valid survey per VP in each season

Period	VP A	VP C
2018 breeding season	43	33
2018/2019 non-breeding season	43	38
2019 breeding season	41	40

[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.

Period	VP A	VP C
2019/2020 non-breeding season	36	33

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 8-1-2** shows the total number of flights recorded and the total number of birds recorded[2]. 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 8-1-2 Target species recorded and total number of flights recorded during flight activity surveys, 2018-2020

Species	Total number of flightlines recorded	Total number of birds recorded	Total bird seconds recorded
Black grouse	2	6	108
Curlew	27	37	1,580
Golden plover	4	81	2,687
Goshawk	1	1	66
Hen harrier	10	10	828
Merlin	3	3	102
Osprey	1	1	180
Peregrine falcon	3	3	113
Pink-footed goose	4	591	41,300
Red kite	7	7	390

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 height[4] (taken to be from 30 m to 180 m for the Proposed Development).

[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.

Goshawk, hen harrier and merlin 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 8-1-3** and **Table 8-1-4** provide the estimated collision rates and number of seasons per collision for each species.

Table 8-1-3 Estimated collision rates

Species	2018 breeding season	2018/2019 non-breeding season	2019 breeding season	2019/2020 non-breeding season	Mean breeding season	Mean non-breeding season	Mean annual
Curlew	0	0	0.0009	0	0.0005	0	0.0005
Golden plover	0	0.0007	0	0.0063	0	0.0035	0.0035
Osprey	0.0015	0	0	0	0.0007	0	0.0007
Peregrine falcon	0.0017	0	0.0011	0	0.0014	0	0.0014
Pink-footed goose	0	0.31	0	0	0	0.1557	0.1557
Red kite	0.0004	0.0006	0	0.002	0.0002	0.0015	0.0017

Table 8-1-4 Estimated number of seasons per collision

Species	2018 breeding season	2018/2019 non-breeding season	2019 breeding season	2019/2020 non-breeding season	Mean breeding season	Mean non-breeding season	Mean annual
Curlew	-	-	1,091	-	2,183	-	2,183
Golden plover	-	1,511	-	158	-	287	287
Osprey	671	-	-	-	1,342	-	1,342
Peregrine falcon	582	-	933	-	717	-	717
Pink-footed goose	-	3.21	-	-	-	6.42	6.42
Red kite	2,562	1,558	-	411	5,123	650	577

4.2 Breeding Birds

Two complete breeding bird seasons (comprising of four visits each) were surveyed in 2018 and 2019 (April to July). Surveys recorded seven wader species, of which six were considered to be

[5] i.e. the flights were either not within the CRAA and associated viewshed or were only recorded flying above turbine height.

breeding (**Table 8-1-5**). Golden plover were recorded but were not considered to be breeding. Full details of the breeding bird surveys are provided within **Annexes C and D** and survey methodology is provided within **Annex B.**

Table 8-1-5 Breeding wader territories, 2018 and 2019 – (number of territories within 500 m study area)

Species	Number of territories 2018	Number of territories 2019
Common sandpiper	2-4	6-9
Curlew	9-16	10-17
Lapwing	0-2	2-5
Oystercatcher	0	1-2
Snipe	5-8	9-12
Woodcock	0	1-5

4.3 Winter Walkover

Winter walkover surveys were conducted during the 2018/2019 and 2019/2020 non-breeding seasons. Surveys recorded 27 species of which two are considered to be target species (**Table 8-1-6**). Full details of the winter walkover surveys are provided within **Annexes C and D** and survey methodology is provided within **Annex B.**

Table 8-1-6 Winter walkover: target species records (number of birds recorded per visit)

Species	2018/2019 non-breeding season		2019/2020 non-breeding season	
	Number of records	Total number of birds	Number of records	Total number of birds
Red kite	-	-	2	2
Snipe	13	13	-	-

4.4 Scarce Breeding Birds

Scarce breeding bird surveys were conducted during the 2018 (March to August) and 2019 (March to August) breeding seasons. Peregrine falcon were confirmed to be breeding and barn owl were identified to be roosting (breeding unknown) within the survey area. Breeding activity is summarised in **Table 8-1-7**. **Confidential Technical Appendix 8.2** contains the full details of all breeding activity.

Table 8-1-7 Scarce breeding bird summary

Species	2018	2019
Barn owl	One roost and/or breeding location identified. No evidence of breeding.	One roost and/or breeding location (same location as 2018). No evidence of breeding.
Peregrine falcon	Adults present on site; but no evidence of breeding.	Two confirmed breeding attempts; success unknown.

Goshawk, hen harrier and red kite (target raptor species) were also recorded during surveys but were not considered to be breeding/no breeding attempts were located.

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 **Annexes C and D** and **Confidential Technical Appendix 8.2** 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 2018 and 2019 breeding seasons during April, May and June. Surveys identified one lek location in 2019 (**Table** 8-1-8). Full details of the black grouse surveys are provided within **Annexes C and D** and survey methodology is provided within **Annex B**.

Table 8-1-8 Black grouse lek activity: 2018 to 2019

Lek	Location	2018		2019	
		Maximum number of males recorded	Maximum number of females recorded	Maximum number of males recorded	Maximum number of females recorded
1	Little Hill	-	-	4	-

[i] Scottish Natural Heritage (2014; updated 2017) Recommended Bird Survey Methods to inform impact assessment of Onshore Windfarms.

ANNEX A. ORNITHOLOGICAL LEGAL PROTECTION

In Scotland, all wild birds are protected under the Wildlife and Countryside Act 1981 (the 'Act'), as amended by the Nature Conservation (Scotland) Act 2004. This protection also extends to their eggs and nests, with it being an offence to intentionally or recklessly[1]:

- Kill, injure or take any wild bird[2];
- Take, damage, destroy or otherwise interfere with the nest of any wild bird while it is being built or is in use[3];
- At any other time take, damage, destroy or otherwise interfere with any nest habitually used by any wild bird included in Schedule A1 (Protected Nests and Nest Sites for Birds: white-tailed eagle and golden eagle)[4];
- Obstruct or prevent any wild bird from using its nest[5]; or
- Take or destroy an egg of any wild bird[6].

It is also an offence to have in possession or control any live or dead wild bird or any part thereof; or any egg or part of an egg of any wild bird[7].

Further special protection under this legislation is afforded to those species listed on Schedule 1 of the Act. For these species, it is an offence to:

- Intentionally or recklessly disturb any wild bird listed on Schedule 1 while it is nest building, or is in, on or near a nest containing eggs or young, or disturb the dependent young of such a bird[8];
- Intentionally or recklessly disturb any wild birds included on Schedule 1 which leks, while it is doing so[9] (capercaillie is the only bird this offence applies to in Scotland);
- Intentionally or recklessly harass any wild bird included in Schedule 1A[10]. Section 1, subsection 5B states, '*Subject to the provisions of this Part, any person who intentionally or recklessly harasses any wild bird included in Schedule 1A shall be guilty of an offence*'. At this time, Schedule 1A includes golden eagle, hen harrier, red kite and white-tailed eagle. This updated legislation was introduced on 16 March 2013; or

[1] Exceptions to these offences exist under various circumstances (e.g. controlling pest species; taking birds during specific season; and killing sick or injured birds etc.).
[2] Wildlife and Countryside Act 1981, Section 1(1)(a)
[3] Wildlife and Countryside Act 1981, Section 1(1)(b)
[4] Wildlife and Countryside Act 1981, Section 1(1)(ba)
[5] Wildlife and Countryside Act 1981, Section 1(1)(bb)
[6] Wildlife and Countryside Act 1981, Section 1(1)(c)
[7] Wildlife and Countryside Act 1981, Section 1(2)
[8] Wildlife and Countryside Act 1981, Section 1(5)
[9] Wildlife and Countryside Act 1981, Section 1(5A)
[10] Wildlife and Countryside Act 1981, Section 1(5B)

- Intentionally or recklessly take, damage, destroy or otherwise interfere with any nest and/or nest site habitually used by any bird on Schedule A1 at any time. At this time, Schedule 1A includes golden eagle and white-tailed eagle[11];

It is also an offence to knowingly cause or permit to be done an act which is made unlawful by any of the above provisions.

Further protection is described under the EU Birds Directive which requires member states to maintain wild bird species in favourable conservation status[12] and promote the conservation of bird species listed within Annex 1 of the Birds Directive through the protection of their habitat. This is achieved via the designation of Special Protection Areas (SPAs).

Red List bird species are those deemed to be globally threatened and to be suffering population declines within the UK. Although not legally enforceable, the conservation of Red List bird species represents a material consideration, in planning terms.

[11] This reflects the changes introduced by the Wildlife and Countryside Act 1981 (as amended by: Variation of Schedules A1 and 1A (Scotland) Order 2013.
[12] While the term 'favourable conservation status' is not used in the Birds Directive, EU court cases over recent years have progressively interpreted the concept as meaningful in a Birds Directive context (SNH, 2006).

ANNEX B. ORNITHOLOGICAL SURVEY METHODOLOGY

A range of ornithological surveys have been conducted at the proposed Cloud Hill Wind Farm (the Proposed Development). The methodologies used in these surveys are summarised in the sections below; more detailed descriptions are provided in the NatureScot guidance (SNH 2017[i]) on which these surveys are based.

B.1 Flight Activity Surveys

The aims of the flight activity (vantage point) surveys are: (1) to record flight activity within the vicinity of the Site in order to identify areas of importance to birds; and (2) to quantify flight activity within 500 m of proposed turbine locations in order to estimate the likelihood of collision (SNH, 2017[i] P.14-19).

Timing

- A survey period of 36 hours is recommended as the minimum level of sampling intensity at each VP for each season (breeding, non-breeding, migratory) (SNH, 2017[i] P.17);
- Watches were spread as evenly throughout the year as possible to ensure that temporally representative data are collected (see **Annex C**). Specific consideration was given to the period around dawn and twilight for breeding waders and to changing raptor behaviour across seasons (SNH, 2017[i] P.17);
- Watches were suspended and resumed to take account of changes in visibility (e.g. fluctuations in cloud base). Watches were undertaken in conditions of good ground visibility when the cloud base was higher than the most elevated ground being observed; and
- Watches were conducted in a range of weather conditions and were spread throughout the day (see **Annex C** and **Annex D**).

Field Methods

- Viewshed analysis was conducted using Arc GIS to confirm suitable Vantage Point (VP) locations and their associated visible areas at 20m above ground level[1];
- Reconnaissance surveys were undertaken to refine VP locations;
- The VP locations and associated viewsheds are shown in **Figure 8.1**;
- Care was taken to maximize the area visible whilst minimising disturbance to birds;
- The final two VP locations were selected with the aim of achieving coverage of all the proposed turbine locations such that no turbine was more than 2 km from a VP. This objective was achieved for all the turbines;
- A maximum 180˚ view arc was scanned by surveyors. This rule did not however apply when tracking migratory waterfowl or raptors across the Site;

[1] The viewsheds are based on a 5m DTM to provide a representation of visibility from the observer locations; this is confirmed and refined through field site visits.

- Each watch lasted a maximum of three hours but was suspended and then resumed to take account of changes in visibility (e.g. fluctuations in the cloud base).

For each target and secondary species, the following data were recorded (SNH, 2017[i] P.17-18):

- The flightlines by individuals or flocks of birds;
- The time the target bird was detected and the duration (seconds) spent flying over a defined survey area (the viewshed);
- The birds' flight heights, defined into five prescribed height bands (0-20 m, 21-40 m, 41-100 m, 101-150 m and >151 m[4]) were recorded at the point of detection and at 15 second intervals thereafter. From this the proportion of time spent flying below, within (referred to as Potential Collision Height (PCH)) and above approximate rotor height could be estimated. The actual planned rotor height is 30– 180 m above ground level. This difference is accounted for within the collision risk models on the assumption of even flight distribution within each height band;
- The route followed was plotted in the field onto 1:25,000 scale maps;
- Observations of target species took priority over recording secondary species if both species were present simultaneously;
- The number of birds recorded were the minimum number of individuals that could account for the activity observed; and
- Observers only recorded perched birds and birds on waterbodies once only on arrival at the VP. Thereafter only flying birds and newly noticed perched/swimming birds were included in the activity summaries.

B.2 Moorland Breeding Bird Survey

Upland breeding bird survey methodology was employed as detailed within NatureScot guidance (SNH, 2017[i] P.11). In summary, surveys involved the following:

- Open upland (including hedgerows, scrub, isolated trees and copses) was surveyed using an intensive version of the Brown and Shepherd (1993[ii]) method for upland bird survey;
- The objectives were to map the distribution of breeding bird territories within 500 m of the Site and estimate the approximate size of breeding bird populations;
- After each survey visit one overview map was then produced showing all target species. The maps from all four survey visits from that year were then compared, enabling the estimation of numbers of breeding territories. This was done by grouping the observations into territories using the methodology described by Bibby *et al.* (2000[iii]). Due to the cryptic nature of many breeding birds and the necessary assumptions made when plotting territories, a minimum and maximum number of territories was identified for each target species;
- The survey covered all areas within 500 m of the Site; and
- All upland wader species were recorded during the breeding bird survey.

Timing

- As recommended in Calladine *et al.* (2009[iv]), four survey visits were undertaken between April and July;
- Fieldwork was undertaken between sunrise and 1800hrs; and
- Fieldwork was not undertaken in conditions considered likely to affect bird detection rates, for example in winds greater than Beaufort Scale Force 4, persistent precipitation, poor visibility (less than 300 m), or in unusually hot weather.

Field Methods

- Walk-routes which optimised ground visibility were used;
- Surveyors paused at appropriate vantage and listening points;
- Isolated trees, copses and patches of scrub were approached and examined;
- Streams, ditches and hedgerows were walked;
- All other areas were approached to within 100 m; and
- Registrations were mapped at the first location that behaviour indicative of breeding was observed; and
- Standard British Trust for Ornithology (BTO) activity codes were used.

B.3 Winter Walkover

Winter walkovers were performed in the non-breeding seasons to map wintering populations of birds within 500 m of the Site.

- The area was surveyed three times during each non-breeding season;
- These surveys involved following a route that optimised ground coverage, such that observers walked within 250 m of every point; and
- Observers periodically stopped at appropriate viewing and listening points along the route and longer vantage point watches were included within the walkover to allow potentially important areas to be monitored in greater detail.

B.4 Scarce Breeding Bird Survey

The aim of the scarce breeding bird surveys was to determine the distribution of occupied nests/territories for target raptor and owl species within 2 km of the Site and record breeding success. Secondary species such as buzzard, sparrowhawk and kestrel were also noted but location of their nests was not the key focus of the surveys. Surveys were undertaken by experienced and licensed[2] field ornithologists. Extreme care was taken to avoid unnecessary disturbance to breeding birds.

Guidance from NatureScot (SNH, 2017[i] P.11-14), '*Bird Monitoring Methods*' (Gilbert *et al.* 1998[v]) and '*Raptors: a field guide to survey and monitoring*' (Hardey *et al.* 2013[vi]) were all consulted to inform survey methodology and are referenced where appropriate in the species methodologies below.

[2] All surveyors hold SNH Schedule 1 Licences.

Barn Owl

- The surveys followed methodology outlined in Gilbert *et al.* (1998), as mentioned in NatureScot guidance (SNH, 2017[i] P12-13);
- Surveys were undertaken within 1 km of the Site; and
- Surveyors checked for signs of occupation (moulted feathers, pellets) in all suitable buildings within this 1 km buffer.

Goshawk

Methodology outlined in Hardey *et al.* (2013[vi]) was used as guidance for the surveying of areas for potential goshawk breeding. Extreme care was taken not to disturb potential nests especially around the time of year when females were likely to be laying or incubating.

- Areas of suitable woodland were observed for the presence of nests. Searches for goshawk nests were focused on mature forestry blocks, although their presence was not ruled out of other wooded areas;
- Searches carried out between March and April focussed on observing territorial and nest building behaviours;
- Where nests were known to be present, scans were carried out between mid-March and May to confirm breeding. Scans were kept brief – carried out for between 5-10 minutes and from a distance; and
- When breeding was confirmed, searches for further nests were deferred until such a time as the young had hatched. Searches were then undertaken between late May and late June for evidence of provisioning young and then between late July and early August to watch for fledgling activity, this included listening for the begging calls of newly fledged young.

Hen Harrier

Methodology outlined in Hardey *et al.* (2013[vi]) was used as guidance for the surveying of areas for potential hen harrier breeding. Extreme care was taken not to disturb potential nests especially around the time of year when females were likely to be laying or in cold/wet weather when females were likely to be incubating or brooding. Areas of suitable habitat[3] were visited during four time periods across the breeding season to:

- Check for territory occupancy (between March and mid-April) – this consisted of watching over suitable habitat from a good vantage point for displaying males (and females) and checking all areas of suitable habitat to within 250 m (watching out for signs of kills);
- Locate incubating females (between mid-April and late May) by listening for female begging calls and watching for food passes between the male and female – surveyors watched for at least four hours as Hardey *et al.* (2013) notes that when the female is incubating it can be up to six hours between feeding visits from the male, but on average it is less than every four hours. Surveys were undertaken between 06:00 to 12:00 or 16:00 to 20:00;

[3] Unsuitable habitat areas include: land above 600 m; improved pasture and arable land; extensive areas of degraded land with no heather cover and low vegetation; the vicinity of cliffs, rocky outcrops, boulder fields and scree; areas within 100 m of hill farms and occupied dwellings.

- Check for young or breeding evidence (between late May and late June) again by listening for female begging calls and watching for food passes between male and female when the female is brooding and watching for the male and female provisioning the nest with food once brooding has ended– surveyors should watch for at least two hours as Hardey *et al.* (2013[vi]) notes that an adult bird will visit the nest every 1-2 hours. Surveyors should also watch for display behaviour which could indicate a failed breeding attempt; and
- Check for fledged young (between late June and late August).

Merlin

Methodology outlined in Hardey *et al.* (2013[vi]) was used as guidance for the surveying of areas for potential merlin breeding.

- Areas of suitable nesting habitat (including forest edge where trees are >5 m high) were closely observed between 20th March and 30th April;
- Boulders, fence lines, isolated posts, stone dykes, grouse butts, hummocks, stream banks, crags, trees and recently burnt areas of heather were checked for signs of occupation (e.g. plucked prey, moulted feathers, pellets and faeces);
- If merlin were observed, or signs found, areas were visited at least twice to verify occupation of the territory; and
- Potential nest areas were watched for 4-6 hours if necessary.

Osprey

Methodology outlined in Hardey *et al.* (2013[vi]) and Gilbert *et al.* (1998[v]) was used as guidance for the surveying of areas for potential osprey breeding. Care was taken when carrying out the searches so as not to disturb any displaying or nesting birds, with nests checked from a distance.

- All wooded areas within the study area were searched for the possible presence of nests, especially those located close to freshwater lochs and rivers that could provide feeding sites. Artificial platforms were also checked;
- If breeding was suspected within the study area, the location was visited between April and May until nesting was confirmed;
- In line with the methods suggested by Gilbert *et al.* (1998[v]) and Hardey *et al.* (2013[vi]), proof of occupancy was determined by:
    - Two osprey seen on the same eyrie on more than one occasion (with a week separating observations); incubation; or feeding of chicks.
- Further scans were undertaken between late May and early July to try and observe any young in the nests.

Peregrine Falcon

- Potential nest sites were visited and checked for evidence of occupation between March and April;
- Sites checked included crags and steep banks identified from OS maps and searches of the survey area;

- Surveyors checked for signs of occupation (e.g. faecal splash, fresh plucked prey);
- If occupied sites were found they were re-visited to verify incubation; and
- Searches were made for eyries. Where this was not possible sites were watched from a suitable vantage point for 3-4 hours or until a nest was located.

Red Kite

Care was taken not to disturb any birds, especially between mid-March and mid-April when disturbance to displaying red kite can cause them to move to another area (Hardey *et al.* 2013[vi]).

- Wooded areas were scanned from outside for the presence of nests, with signs occupation searched for between February and March;
- Potential territories were watched for 1-2 hours between March and April to observe any breeding or nest-building behaviour; and
- Where breeding was confirmed, nests were scanned to determine the breeding success between late April and late June/early July.

Short-Eared Owl

- At least two visits between early April and the end of May were carried out;
- Suitable habitat was visited and checked for evidence of hunting males, territorial activity and other signs of presence; and
- If breeding was confirmed, a further visit was be made in June to watch birds, locate nest-sites and confirm breeding behaviour wherever possible.

B.5 Black Grouse Survey

The survey methodology used is detailed in NatureScot guidance (SNH, 2017[i] P.12). A summary is provided below.

- Breeding black grouse were surveyed within 1.5 km of the Site boundary by counting total numbers of males and females at leks, most lekking activity taking place at or soon after dawn in spring.
- Known lek sites and other areas of suitable habitat which can host leks were identified and visited during April and May within 2 hours of dawn on calm dry days with good visibility;
- Visits involved listening and scanning for lekking black grouse from strategic locations (avoiding disturbance of leks) and during walks between these locations ensuring that all potential habitat was covered;
- The maximum count of males in the two hours around dawn gives the standard count estimate but the maximum number of females seen was also presented; and
- Leks that were at least 200 m apart within the same year were treated as separate leks.

[i] Scottish Natural Heritage (2017) Recommended bird survey methods to inform impact assessment of onshore windfarms.
[ii] Brown, A. F. and Shepherd, K. B. (1993) A method for censusing upland breeding waders. Bird Study, 40: 189-195.

[iii] Bibby, C. J., Neil D. Burgess, David A. Hill and Simon H. Mustoe (2000) Bird Census Techniques, 2nd Edition, London, Academic Press.
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ANNEX C. ORNITHOLOGICAL SURVEY EFFORT & GENERAL INFORMATION

Table C-1 shows the system used for recording weather conditions on all the surveys (sections **C.1** to **C.5** below).

Table C-1 Key to meteorological conditions recorded during all surveys

Wind speed				Rain		Cloud cover		Cloud height	
Calm	0	Moderate gale	7	None	0	In eighths		<150m	0
Light air	1	Fresh gale	8	Drizzle/Mist	1	*e.g.*	3/8	150-500m	1
Light breeze	2	Strong gale	9	Light showers	2			>500m	2
Gentle breeze	3	Whole gale	10	Heavy showers	3				
Moderate breeze	4	Storm	11	Heavy rain	4				
Fresh breeze	5	Hurricane	12	**Snow**		**Frost**		**Visibility**	
Strong breeze	6			None	0	None	0	Poor (<1km)	0
				On site	1	Ground	1	Moderate (1-2km)	1
				High ground	2	All day	2	Good (>2km)	2

C.1 Flight Activity Surveys

Flight activity surveys were undertaken during the 2018 and 2019 breeding seasons and 2018/2019 and 2019/2020 non-breeding seasons. Details of the flight activity surveys undertaken across each Vantage Point (VP) location are supplied in **Table C-2** (survey hours per VP per season are summarised in **Technical Appendix 8.1 Table 6-1**) and the associated weather data recorded is detailed in **Table C-3**. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-2 Summary of flight activity surveys undertaken at Cloud Hill Wind Farm (sorted chronologically)

Date	Season	Observer	VP	Survey start time	Survey finish time	No. hours[1] surveyed
29/03/2018	2018 BR	MW	A	0730	1030	2
29/03/2018	2018 BR	MW	A	1100	1400	3
02/04/2018	2018 BR	MW	A	0730	1030	3
02/04/2018	2018 BR	MW	A	1100	1300	1
09/04/2018	2018 BR	MW	A	0700	1000	1
09/04/2018	2018 BR	MW	A	1030	1330	3
10/04/2018	2018 BR	MW	C	1030	1330	3
02/05/2018	2018 BR	MW	A	0630	0930	3
02/05/2018	2018 BR	MW	A	1000	1300	3
03/05/2018	2018 BR	MW	C	0600	0900	3
03/05/2018	2018 BR	MW	C	0930	1230	3
07/06/2018	2018 BR	MW	C	0530	0830	3
07/06/2018	2018 BR	MW	C	0900	1200	3
12/06/2018	2018 BR	MW	A	0645	0945	3
12/06/2018	2018 BR	MW	A	1015	1315	3
18/06/2018	2018 BR	MW	A	0800	1100	3
18/06/2018	2018 BR	MW	A	1130	1430	3

[1] Note: only valid hours (i.e. where visibility was at least 1 km) are presented in this column.

Date	Season	Observer	VP	Survey start time	Survey finish time	No. hours[1] surveyed
20/07/2018	2018 BR	MW	A	0700	1000	3
20/07/2018	2018 BR	MW	A	1030	1330	3
26/07/2018	2018 BR	MW	C	0615	0915	3
26/07/2018	2018 BR	MW	C	0945	1245	3
30/07/2018	2018 BR	MW	A	0800	1100	3
30/07/2018	2018 BR	MW	A	1130	1430	3
14/08/2018	2018 BR	MW	C	0700	1000	3
14/08/2018	2018 BR	MW	C	1030	1330	3
27/08/2018	2018 BR	MW	C	0700	1000	3
27/08/2018	2018 BR	MW	C	1030	1330	3
03/09/2018	2018/2019 NBR	MW	C	0800	1100	3
03/09/2018	2018/2019 NBR	MW	C	1130	1430	3
06/09/2018	2018/2019 NBR	MW	A	0715	1015	3
06/09/2018	2018/2019 NBR	MW	A	1045	1345	3
14/09/2018	2018/2019 NBR	MW	C	0645	0945	3
14/09/2018	2018/2019 NBR	MW	A	1015	1315	3
03/10/2018	2018/2019 NBR	MW	A	0700	1000	3
03/10/2018	2018/2019 NBR	MW	A	1030	1330	3
11/10/2018	2018/2019 NBR	MW	C	0730	1030	3
11/10/2018	2018/2019 NBR	MW	C	1100	1400	3
18/10/2018	2018/2019 NBR	MW	A	0730	1030	3
18/10/2018	2018/2019 NBR	MW	A	1100	1400	3
05/11/2018	2018/2019 NBR	MW	A	0800	1100	3
05/11/2018	2018/2019 NBR	MW	A	1130	1430	3
08/11/2018	2018/2019 NBR	MW	C	0730	1030	3
08/11/2018	2018/2019 NBR	MW	C	1100	1300	2
03/12/2018	2018/2019 NBR	MW	A	0750	1050	3
03/12/2018	2018/2019 NBR	MW	A	1120	1320	2
04/12/2018	2018/2019 NBR	MW	C	0800	1100	3
04/12/2018	2018/2019 NBR	MW	C	1130	1330	2
08/01/2019	2018/2019 NBR	MW	A	0815	1115	3
08/01/2019	2018/2019 NBR	MW	A	1145	1345	2

Date	Season	Observer	VP	Survey start time	Survey finish time	No. hours[1] surveyed
09/01/2019	2018/2019 NBR	MW	C	0800	1100	3
09/01/2019	2018/2019 NBR	MW	C	1130	1330	2
05/02/2019	2018/2019 NBR	MW	A	0735	1035	2
07/02/2019	2018/2019 NBR	MW	A	0740	1040	2
07/02/2019	2018/2019 NBR	MW	A	1110	1310	2
21/02/2019	2018/2019 NBR	MW	C	1020	1320	3
25/02/2019	2018/2019 NBR	MW	C	0730	1030	3
25/02/2019	2018/2019 NBR	MW	C	1100	1300	2
19/03/2019	2019 BR	MW	A	0630	0930	3
19/03/2019	2019 BR	MW	A	1000	1200	2
20/03/2019	2019 BR	MW	C	0700	1000	2
20/03/2019	2019 BR	MW	C	1030	1330	3
18/04/2019	2019 BR	MW	A	0700	1000	3
18/04/2019	2019 BR	MW	A	1030	1330	3
22/04/2019	2019 BR	MW	C	0700	1000	3
22/04/2019	2019 BR	MW	C	1030	1330	3
03/05/2019	2019 BR	MW	A	0630	0930	3
03/05/2019	2019 BR	MW	A	1000	1300	3
29/05/2019	2019 BR	MW	C	0500	0800	3
29/05/2019	2019 BR	MW	C	0830	1130	3
05/06/2019	2019 BR	MW	A	0600	0900	3
05/06/2019	2019 BR	MW	A	0930	1230	3
28/06/2019	2019 BR	MW	C	0715	1015	3
28/06/2019	2019 BR	MW	C	1045	1345	3
01/07/2019	2019 BR	MW	A	0800	1100	3
01/07/2019	2019 BR	MW	A	1130	1430	3
22/07/2019	2019 BR	MW	A	0730	1030	3
22/07/2019	2019 BR	MW	A	1100	1400	3
06/08/2019	2019 BR	MW	C	0700	1000	3
06/08/2019	2019 BR	MW	C	1030	1330	3
12/08/2019	2019 BR	MW	A	0800	1100	3
12/08/2019	2019 BR	MW	A	1130	1430	3
15/08/2019	2019 BR	MW	C	0630	0930	3
15/08/2019	2019 BR	MW	C	1000	1300	3
16/08/2019	2019 BR	MW	C	0800	1100	2
16/08/2019	2019 BR	MW	C	1130	1430	3
02/09/2019	2019/2020 NBR	MW	A	1240	1540	3
02/09/2019	2019/2020 NBR	MW	A	1610	1910	3
11/09/2019	2019/2020 NBR	MW	A	0700	1000	3
11/09/2019	2019/2020 NBR	MW	A	1030	1330	3
13/09/2019	2019/2020 NBR	MW	C	0615	0915	3

Date	Season	Observer	VP	Survey start time	Survey finish time	No. hours[1] surveyed
13/09/2019	2019/2020 NBR	MW	C	0945	1245	3
14/10/2019	2019/2020 NBR	MW	C	0930	1230	2
14/10/2019	2019/2020 NBR	MW	C	1300	1600	1
21/10/2019	2019/2020 NBR	MW	A	0745	1045	3
21/10/2019	2019/2020 NBR	MW	A	1115	1415	3
25/11/2019	2019/2020 NBR	MW	C	0815	1115	3
25/11/2019	2019/2020 NBR	MW	C	1145	1345	2
29/11/2019	2019/2020 NBR	MW	A	0745	1045	3
29/11/2019	2019/2020 NBR	MW	A	1115	1315	2
02/12/2019	2019/2020 NBR	MW	A	0830	1130	3
02/12/2019	2019/2020 NBR	MW	A	1200	1400	2
12/12/2019	2019/2020 NBR	MW	C	0830	1130	1
03/01/2020	2019/2020 NBR	MW	C	0830	1130	3
03/01/2020	2019/2020 NBR	MW	C	1200	1400	2
08/01/2020	2019/2020 NBR	MW	A	0815	1115	3
08/01/2020	2019/2020 NBR	MW	A	1145	1345	2
03/02/2020	2019/2020 NBR	MW	C	0800	1100	3
03/02/2020	2019/2020 NBR	MW	C	1130	1330	2
17/02/2020	2019/2020 NBR	MW	C	0730	1030	3
17/02/2020	2019/2020 NBR	MW	C	1100	1300	2
09/03/2020	2019/2020 NBR	MW	C	0830	1130	3
09/03/2020	2019/2020 NBR	MW	A	1200	1500	3

Table C-3 Meteorological conditions during flight activity surveys at Cloud Hill Wind Farm (sorted chronologically)

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
29/03/2018	MW	A	0730	1030	1	2	NE	0	7	2	2	1	2
29/03/2018	MW	A	0730	1030	2	2	NE	0	8	1	1	1	2
29/03/2018	MW	A	0730	1030	3	3	NE	0	8	0	0	1	2
29/03/2018	MW	A	1100	1400	1	4	NE	0	7	2	2	1	2
29/03/2018	MW	A	1100	1400	2	5	NE	0	6	2	2	0	2
29/03/2018	MW	A	1100	1400	3	6	N	0	5	2	2	0	2
02/04/2018	MW	A	0730	1030	1	5	E	4	8	1	1	1	1
02/04/2018	MW	A	0730	1030	2	6	E	4	8	1	1	1	1
02/04/2018	MW	A	0730	1030	3	6	E	4	8	1	2	1	1
02/04/2018	MW	A	1100	1300	1	7	E	4	8	1	1	1	1
02/04/2018	MW	A	1100	1300	2	7	E	4	8	0	0	1	1
09/04/2018	MW	A	0700	1030	1	2	SE	0	8	1	1	0	0
09/04/2018	MW	A	0700	1000	2	2	SE	1	8	0	0	0	0
09/04/2018	MW	A	0700	1000	3	2	ESE	1	8	0	0	0	0
09/04/2018	MW	A	1030	1000	1	3	ESE	0	8	1	1	0	0
09/04/2018	MW	A	1030	1030	2	4	ESE	0	8	2	2	0	0
09/04/2018	MW	A	1030	1030	3	5	ESE	0	8	2	2	0	0
10/04/2018	MW	C	1030	1330	1	5	NE	3	8	2	2	0	0
10/04/2018	MW	C	1030	1330	2	6	NE	4	8	2	2	0	0
10/04/2018	MW	C	1030	1330	3	6	NE	4	8	2	2	0	0
02/05/2018	MW	A	0630	0930	1	6	NNW	0	3	2	2	0	0
02/05/2018	MW	A	0630	0930	2	7	NNW	0	2	2	2	0	0
02/05/2018	MW	A	0630	0930	3	7	NNW	0	3	2	2	0	0
02/05/2018	MW	A	1000	1300	1	7	NNW	0	4	2	2	0	0
02/05/2018	MW	A	1000	1300	2	7	NNW	0	4	2	2	0	0
02/05/2018	MW	A	1000	1300	3	7	NNW	0	5	2	2	0	0
03/05/2018	MW	C	0600	0900	1	6	SW	0	8	2	2	0	0
03/05/2018	MW	C	0600	0900	2	6	SW	0	8	2	2	0	0
03/05/2018	MW	C	0600	0900	3	6	SSW	0	8	2	2	0	0
03/05/2018	MW	C	0930	1230	1	6	SSW	0	8	2	2	0	0
03/05/2018	MW	C	0930	1230	2	6	SSW	0	8	2	2	0	0
03/05/2018	MW	C	0930	1230	3	6	SSW	0	8	2	2	0	0

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
07/06/2018	MW	C	0530	0830	1	1	SE	0	1	2	2	0	0
07/06/2018	MW	C	0530	0830	2	1	SE	0	1	2	2	0	0
07/06/2018	MW	C	0530	0830	3	2	SE	0	1	2	2	0	0
07/06/2018	MW	C	0900	1200	1	2	S	0	1	2	2	0	0
07/06/2018	MW	C	0900	1200	2	3	S	0	1	2	2	0	0
07/06/2018	MW	C	0900	1200	3	3	S	0	1	2	2	0	0
12/06/2018	MW	A	0645	0945	1	1	WNW	0	8	2	2	0	0
12/06/2018	MW	A	0645	0945	2	1	WNW	0	8	2	2	0	0
12/06/2018	MW	A	0645	0945	3	1	WNW	0	8	2	2	0	0
12/06/2018	MW	A	1015	1315	1	2	WNW	0	8	2	2	0	0
12/06/2018	MW	A	1015	1315	2	2	WNW	0	7	2	2	0	0
12/06/2018	MW	A	1015	1315	3	3	WNW	0	8	2	2	0	0
18/06/2018	MW	A	0800	1100	1	3	WSW	0	8	2	2	0	0
18/06/2018	MW	A	0800	1100	2	4	WSW	0	8	2	2	0	0
18/06/2018	MW	A	0800	1100	3	5	WSW	0	8	2	2	0	0
18/06/2018	MW	A	1130	1430	1	5	SW	0	8	2	2	0	0
18/06/2018	MW	A	1130	1430	2	6	SW	0	8	2	2	0	0
18/06/2018	MW	A	1130	1430	3	6	SW	0	8	2	2	0	0
20/07/2018	MW	A	0700	1000	1	3	SSW	2	8	2	2	0	0
20/07/2018	MW	A	0700	1000	2	3	SSW	3	8	2	2	0	0
20/07/2018	MW	A	0700	1000	3	4	SSW	4	8	2	2	0	0
20/07/2018	MW	A	1030	1330	1	5	SSW	0	8	1	2	0	0
20/07/2018	MW	A	1030	1330	2	6	SSW	0	8	1	2	0	0
20/07/2018	MW	A	1030	1330	3	6	SSW	0	8	2	2	0	0
26/07/2018	MW	C	0615	0915	1	3	S	0	2	2	2	0	0
26/07/2018	MW	C	0615	0915	2	3	S	0	2	2	2	0	0
26/07/2018	MW	C	0615	0915	3	4	S	0	3	2	2	0	0
26/07/2018	MW	C	0945	1245	1	4	SSE	0	4	2	2	0	0
26/07/2018	MW	C	0945	1245	2	5	SSE	0	3	2	2	0	0
26/07/2018	MW	C	0945	1245	3	6	SSE	0	4	2	2	0	0
30/07/2018	MW	A	0800	1100	1	5	S	0	7	2	2	0	0
30/07/2018	MW	A	0800	1100	2	6	S	3	8	2	2	0	0
30/07/2018	MW	A	0800	1100	3	6	S	0	7	2	2	0	0

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
30/07/2018	MW	A	1130	1430	1	7	S	3	8	2	2	0	0
30/07/2018	MW	A	1130	1430	2	7	S	0	7	2	2	0	0
30/07/2018	MW	A	1130	1430	3	7	S	0	6	2	2	0	0
14/08/2018	MW	C	0700	1000	1	4	SW	0	8	2	2	0	0
14/08/2018	MW	C	0700	1000	2	4	SW	0	8	2	2	0	0
14/08/2018	MW	C	0700	1000	3	4	SW	0	8	2	2	0	0
14/08/2018	MW	C	1030	1330	1	5	SW	0	8	2	2	0	0
14/08/2018	MW	C	1030	1330	2	4	SW	1	8	1	1	0	0
14/08/2018	MW	C	1030	1330	3	5	SW	4	8	2	1	0	0
27/08/2018	MW	C	0700	1000	1	5	W	1	8	2	2	0	0
27/08/2018	MW	C	0700	1000	2	5	W	0	8	2	2	0	0
27/08/2018	MW	C	0700	1000	3	5	W	1	8	2	2	0	0
27/08/2018	MW	C	1030	1330	1	6	W	0	8	2	2	0	0
27/08/2018	MW	C	1030	1330	2	6	W	0	8	2	2	0	0
27/08/2018	MW	C	1030	1330	3	6	W	0	8	2	2	0	0
03/09/2018	MW	C	0800	1100	1	5	WNW	0	8	2	2	0	0
03/09/2018	MW	C	0800	1100	2	5	WNW	0	8	2	2	0	0
03/09/2018	MW	C	0800	1100	3	5	WNW	0	8	2	2	0	0
03/09/2018	MW	C	1130	1430	1	6	WNW	0	8	2	2	0	0
03/09/2018	MW	C	1130	1430	2	6	WNW	0	8	2	2	0	0
03/09/2018	MW	C	1130	1430	3	6	WNW	0	8	2	2	0	0
06/09/2018	MW	A	0715	1015	1	2	WNW	0	8	2	2	0	0
06/09/2018	MW	A	0715	1015	2	2	WNW	0	8	2	2	0	0
06/09/2018	MW	A	0715	1015	3	1	WNW	4	8	2	2	0	0
06/09/2018	MW	A	1045	1345	1	1	WNW	4	8	2	2	0	0
06/09/2018	MW	A	1045	1345	2	2	WNW	0	7	2	2	0	0
06/09/2018	MW	A	1045	1345	3	4	WNW	0	6	2	2	0	0
14/09/2018	MW	C	0645	0945	1	6	WSW	4	8	2	2	0	0
14/09/2018	MW	C	0645	0945	2	6	WSW	4	8	2	2	0	0
14/09/2018	MW	C	0645	0945	3	6	WSW	2	8	2	2	0	0
14/09/2018	MW	A	1015	1315	1	5	WSW	4	8	2	2	0	0
14/09/2018	MW	A	1015	1315	2	5	WSW	4	8	2	2	0	0
14/09/2018	MW	A	1015	1315	3	5	WSW	3	8	2	2	0	0

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
03/10/2018	MW	A	0700	1000	1	4	W	0	8	2	2	0	0
03/10/2018	MW	A	0700	1000	2	4	W	0	8	2	2	0	0
03/10/2018	MW	A	0700	1000	3	5	W	0	8	2	2	0	0
03/10/2018	MW	A	1030	1330	1	5	W	0	8	2	2	0	0
03/10/2018	MW	A	1030	1330	2	6	W	0	8	2	2	0	0
03/10/2018	MW	A	1030	1330	3	7	W	0	8	2	2	0	0
11/10/2018	MW	C	0730	1030	1	5	SE	0	8	1	1	0	0
11/10/2018	MW	C	0730	1030	2	6	SE	0	8	2	2	0	0
11/10/2018	MW	C	0730	1030	3	6	SE	0	8	2	2	0	0
11/10/2018	MW	C	1100	1400	1	6	SE	0	8	2	2	0	0
11/10/2018	MW	C	1100	1400	2	7	SE	0	8	2	2	0	0
11/10/2018	MW	C	1100	1400	3	6	SE	0	8	2	2	0	0
18/10/2018	MW	A	0730	1030	1	1	NW	0	1	2	1	1	0
18/10/2018	MW	A	0730	1030	2	1	NW	0	3	2	2	0	0
18/10/2018	MW	A	0730	1030	3	1	SW	0	8	2	2	0	0
18/10/2018	MW	A	1100	1400	1	2	SW	0	8	2	2	0	0
18/10/2018	MW	A	1100	1400	2	2	SW	0	8	2	2	0	0
18/10/2018	MW	A	1100	1400	3	3	SW	0	8	2	2	0	0
05/11/2018	MW	A	0800	1100	1	4	SE	0	8	2	2	0	0
05/11/2018	MW	A	0800	1100	2	5	SE	0	8	2	2	0	0
05/11/2018	MW	A	0800	1100	3	5	SE	0	8	2	2	0	0
05/11/2018	MW	A	1130	1430	1	5	SE	0	8	2	2	0	0
05/11/2018	MW	A	1130	1430	2	5	SE	2	8	2	2	0	0
05/11/2018	MW	A	1130	1430	3	6	SE	2	8	2	2	0	0
08/11/2018	MW	C	0730	1030	1	6	SE	4	8	2	2	0	0
08/11/2018	MW	C	0730	1030	2	6	SE	4	8	2	2	0	0
08/11/2018	MW	C	0730	1030	3	6	SE	4	8	2	2	0	0
08/11/2018	MW	C	1100	1300	1	6	SE	4	8	2	2	0	0
08/11/2018	MW	C	1100	1300	2	6	SE	4	8	2	2	0	0
03/12/2018	MW	A	0750	1050	1	2	WNW	0	3	2	2	1	0
03/12/2018	MW	A	0750	1050	2	3	WNW	0	3	2	2	0	0
03/12/2018	MW	A	0750	1050	3	3	WNW	0	4	2	2	0	0
03/12/2018	MW	A	1120	1320	1	3	WNW	0	4	2	2	0	0

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
03/12/2018	MW	A	1120	1320	2	4	WNW	0	4	2	2	0	0
04/12/2018	MW	C	0800	1100	1	1	WNW	0	1	2	2	1	0
04/12/2018	MW	C	0800	1100	2	2	WNW	0	2	2	2	1	0
04/12/2018	MW	C	0800	1100	3	3	WNW	0	3	2	2	1	0
04/12/2018	MW	C	1130	1330	1	4	W	0	4	2	2	1	0
04/12/2018	MW	C	1130	1330	2	5	SW	0	5	2	2	1	0
08/01/2019	MW	A	0815	1115	1	5	NW	0	2	2	2	1	0
08/01/2019	MW	A	0815	1115	2	5	NW	0	3	2	2	1	0
08/01/2019	MW	A	0815	1115	3	5	NW	0	3	2	2	1	0
08/01/2019	MW	A	1145	1345	1	5	NW	0	3	2	2	0	0
08/01/2019	MW	A	1145	1345	2	5	NW	0	4	2	2	0	0
09/01/2019	MW	C	0800	1100	1	2	NE	0	1	2	2	1	0
09/01/2019	MW	C	0800	1100	2	2	NE	0	1	2	2	1	0
09/01/2019	MW	C	0800	1100	3	1	NE	0	2	2	2	1	0
09/01/2019	MW	C	1130	1330	1	1	NE	0	2	2	2	1	0
09/01/2019	MW	C	1130	1330	2	1	NE	0	3	2	2	1	0
05/02/2019	MW	A	0735	1035	1	1	SE	0	8	1	1	1	1
05/02/2019	MW	A	0735	1035	2	2	SE	0	8	1	1	1	1
07/02/2019	MW	A	0740	1040	1	3	SW	0	8	2	2	1	0
07/02/2019	MW	A	0740	1040	2	5	SW	2	8	0	0	1	0
07/02/2019	MW	A	0740	1040	3	5	SW	0	7	2	2	0	0
07/02/2019	MW	A	1110	1310	1	5	SW	0	6	2	2	0	0
07/02/2019	MW	A	1110	1310	2	6	SW	0	5	2	2	0	0
21/02/2019	MW	C	1020	1320	1	5	SW	0	8	1	1	0	0
21/02/2019	MW	C	1020	1320	2	6	SW	1	8	1	1	0	0
21/02/2019	MW	C	1020	1320	3	5	SW	0	8	1	1	0	0
25/02/2019	MW	C	0730	1030	1	2	SSE	0	7	2	2	0	0
25/02/2019	MW	C	0730	1030	2	3	SSE	0	7	2	2	0	0
25/02/2019	MW	C	0730	1030	3	3	SSE	0	4	2	2	0	0
25/02/2019	MW	C	1100	1300	1	3	SSE	0	4	2	2	0	0
25/02/2019	MW	C	1100	1300	2	4	SSE	0	3	2	2	0	0
19/03/2019	MW	A	0630	0930	1	2	SW	2	8	2	2	0	2
19/03/2019	MW	A	0630	0930	2	2	SW	2	8	2	2	0	2

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
19/03/2019	MW	A	0630	0930	3	4	SW	0	8	2	2	0	2
19/03/2019	MW	A	1000	1200	1	4	SW	0	8	2	2	0	2
19/03/2019	MW	A	1000	1200	2	5	SW	0	8	2	2	0	2
20/03/2019	MW	C	0700	1000	1	2	SSW	1	8	1	1	0	2
20/03/2019	MW	C	0700	1000	2	3	SSW	1	8	0	0	0	2
20/03/2019	MW	C	0700	1000	3	4	SSW	0	8	2	2	0	2
20/03/2019	MW	C	1030	1330	1	5	SSW	0	8	2	2	0	2
20/03/2019	MW	C	1030	1330	2	5	SSW	0	8	2	2	0	2
20/03/2019	MW	C	1030	1330	3	6	SSW	0	7	2	2	0	2
18/04/2019	MW	A	0700	1000	1	3	E	0	1	2	2	0	0
18/04/2019	MW	A	0700	1000	2	3	E	0	2	2	2	0	0
18/04/2019	MW	A	0700	1000	3	4	E	0	2	2	2	0	0
18/04/2019	MW	A	1030	1330	1	4	E	0	2	2	2	0	0
18/04/2019	MW	A	1030	1330	2	5	E	0	3	2	2	0	0
18/04/2019	MW	A	1030	1330	3	5	E	0	2	2	2	0	0
22/04/2019	MW	C	0700	1000	1	4	ESE	0	1	2	2	0	0
22/04/2019	MW	C	0700	1000	2	5	ESE	0	1	2	2	0	0
22/04/2019	MW	C	0700	1000	3	5	ESE	0	1	2	2	0	0
22/04/2019	MW	C	1030	1330	1	5	ESE	0	2	2	2	0	0
22/04/2019	MW	C	1030	1330	2	6	ESE	0	2	2	2	0	0
22/04/2019	MW	C	1030	1330	3	6	ESE	0	2	2	2	0	0
03/05/2019	MW	A	0630	0930	1	1	NE	0	8	2	2	0	0
03/05/2019	MW	A	0630	0930	2	2	NE	0	8	2	2	0	0
03/05/2019	MW	A	0630	0930	3	3	NE	0	8	2	2	0	0
03/05/2019	MW	A	1000	1300	1	4	NNE	0	8	2	2	0	0
03/05/2019	MW	A	1000	1300	2	4	NNE	0	8	2	2	0	0
03/05/2019	MW	A	1000	1300	3	4	NNE	0	8	2	2	0	0
29/05/2019	MW	C	0500	0800	1	1	SSW	0	8	2	2	1	0
29/05/2019	MW	C	0500	0800	2	2	S	0	8	2	2	0	0
29/05/2019	MW	C	0500	0800	3	3	S	0	8	2	2	0	0
29/05/2019	MW	C	0830	1130	1	4	SSE	2	8	2	2	0	0
29/05/2019	MW	C	0830	1130	2	5	SSE	3	8	2	2	0	0
29/05/2019	MW	C	0830	1130	3	5	SSE	4	8	2	2	0	0

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
05/06/2019	MW	A	0600	0900	1	1	SW	1	8	1	1	0	0
05/06/2019	MW	A	0600	0900	2	1	SW	1	8	1	1	0	0
05/06/2019	MW	A	0600	0900	3	2	SW	0	8	2	2	0	0
05/06/2019	MW	A	0930	1230	1	2	SW	0	8	2	2	0	0
05/06/2019	MW	A	0930	1230	2	3	SW	0	8	2	2	0	0
05/06/2019	MW	A	0930	1230	3	4	SW	0	8	2	2	0	0
28/06/2019	MW	C	0715	1015	1	2	SE	0	0	2	2	0	0
28/06/2019	MW	C	0715	1015	2	3	SE	0	0	2	2	0	0
28/06/2019	MW	C	0715	1015	3	5	SE	0	0	2	2	0	0
28/06/2019	MW	C	1045	1345	1	6	ESE	0	0	2	2	0	0
28/06/2019	MW	C	1045	1345	2	6	ESE	0	0	2	2	0	0
28/06/2019	MW	C	1045	1345	3	6	E	0	0	2	2	0	0
01/07/2019	MW	A	0800	1100	1	6	W	2	8	2	2	0	0
01/07/2019	MW	A	0800	1100	2	7	W	0	8	2	2	0	0
01/07/2019	MW	A	0800	1100	3	8	W	3	7	2	2	0	0
01/07/2019	MW	A	1130	1430	1	8	WNW	0	7	2	2	0	0
01/07/2019	MW	A	1130	1430	2	8	WNW	3	6	2	2	0	0
01/07/2019	MW	A	1130	1430	3	8	WNW	0	6	2	2	0	0
22/07/2019	MW	A	0730	1030	1	7	SW	0	8	1	1	0	0
22/07/2019	MW	A	0730	1030	2	7	SW	0	8	1	1	0	0
22/07/2019	MW	A	0730	1030	3	8	SW	0	8	2	2	0	0
22/07/2019	MW	A	1100	1400	1	8	SW	0	7	2	2	0	0
22/07/2019	MW	A	1100	1400	2	7	SW	0	7	2	2	0	0
22/07/2019	MW	A	1100	1400	3	7	SW	0	7	2	2	0	0
06/08/2019	MW	C	0700	1000	1	3	SSW	3	8	2	2	0	0
06/08/2019	MW	C	0700	1000	2	4	SSW	3	8	2	2	0	0
06/08/2019	MW	C	0700	1000	3	4	S	0	8	2	2	0	0
06/08/2019	MW	C	1030	1330	1	4	S	0	7	2	2	0	0
06/08/2019	MW	C	1030	1330	2	4	S	0	7	2	2	0	0
06/08/2019	MW	C	1030	1330	3	4	S	0	7	2	2	0	0
12/08/2019	MW	A	0800	1100	1	3	WNW	0	4	2	2	0	0
12/08/2019	MW	A	0800	1100	2	3	WNW	0	3	2	2	0	0
12/08/2019	MW	A	0800	1100	3	3	WNW	0	4	2	2	0	0

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
12/08/2019	MW	A	1130	1430	1	3	WNW	0	3	2	2	0	0
12/08/2019	MW	A	1130	1430	2	4	WNW	0	4	2	2	0	0
12/08/2019	MW	A	1130	1430	3	4	WNW	0	6	2	2	0	0
15/08/2019	MW	C	0630	0930	1	5	NNW	4	8	1	1	0	0
15/08/2019	MW	C	0630	0930	2	6	NNW	3	8	2	2	0	0
15/08/2019	MW	C	0630	0930	3	7	NNW	0	7	2	2	0	0
15/08/2019	MW	C	1000	1300	1	7	N	0	6	2	2	0	0
15/08/2019	MW	C	1000	1300	2	7	NNE	0	5	2	2	0	0
15/08/2019	MW	C	1000	1300	3	8	NNE	0	4	2	2	0	0
16/08/2019	MW	C	0800	1100	1	7	SW	4	8	1	1	0	0
16/08/2019	MW	C	0800	1100	2	7	SW	4	8	2	2	0	0
16/08/2019	MW	C	0800	1100	3	7	SW	4	8	0	0	0	0
16/08/2019	MW	C	1130	1430	1	7	SW	4	8	1	1	0	0
16/08/2019	MW	C	1130	1430	2	8	SW	4	8	1	1	0	0
16/08/2019	MW	C	1130	1430	3	8	SW	4	8	1	1	0	0
02/09/2019	MW	A	1240	1540	1	6	SW	4	8	1	1	0	0
02/09/2019	MW	A	1240	1540	2	6	SW	4	8	1	1	0	0
02/09/2019	MW	A	1240	1540	3	6	SW	4	8	2	2	0	0
02/09/2019	MW	A	1610	1910	1	6	SW	4	8	2	2	0	0
02/09/2019	MW	A	1610	1910	2	6	SW	4	8	2	2	0	0
02/09/2019	MW	A	1610	1910	3	6	SW	4	8	2	2	0	0
11/09/2019	MW	A	0700	1000	1	6	W	0	7	2	2	0	0
11/09/2019	MW	A	0700	1000	2	7	W	0	6	2	2	0	0
11/09/2019	MW	A	0700	1000	3	7	W	3	8	2	2	0	0
11/09/2019	MW	A	1030	1330	1	8	W	3	8	2	2	0	0
11/09/2019	MW	A	1030	1330	2	8	W	3	8	2	2	0	0
11/09/2019	MW	A	1030	1330	3	7	W	3	8	2	2	0	0
13/09/2019	MW	C	0615	0915	1	3	W	0	3	2	2	0	0
13/09/2019	MW	C	0615	0915	2	3	W	0	3	2	2	0	0
13/09/2019	MW	C	0615	0915	3	4	W	0	3	2	2	0	0
13/09/2019	MW	C	0945	1245	1	4	WSW	0	4	2	2	0	0
13/09/2019	MW	C	0945	1245	2	4	WSW	0	3	2	2	0	0
13/09/2019	MW	C	0945	1245	3	5	WSW	0	4	2	2	0	0

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
14/10/2019	MW	C	0930	1230	1	1	SE	0	8	1	1	0	0
14/10/2019	MW	C	0930	1230	2	1	SE	0	8	0	0	0	0
14/10/2019	MW	C	0930	1230	3	2	SE	0	8	2	2	0	0
14/10/2019	MW	C	1300	1600	1	2	SE	0	8	2	2	0	0
14/10/2019	MW	C	1300	1600	2	1	SE	0	8	0	0	0	0
14/10/2019	MW	C	1300	1600	3	1	SE	0	8	0	0	0	0
21/10/2019	MW	A	0745	1045	1	1	NE	0	2	2	2	1	0
21/10/2019	MW	A	0745	1045	2	2	NE	0	2	2	2	1	0
21/10/2019	MW	A	0745	1045	3	2	SW	0	3	2	2	0	0
21/10/2019	MW	A	1115	1415	1	2	SW	0	4	2	2	0	0
21/10/2019	MW	A	1115	1415	2	3	SW	0	5	2	2	0	0
21/10/2019	MW	A	1115	1415	3	3	SW	0	7	2	2	0	0
25/11/2019	MW	C	0815	1115	1	2	ESE	1	8	1	1	0	0
25/11/2019	MW	C	0815	1115	2	2	ESE	1	8	1	1	0	0
25/11/2019	MW	C	0815	1115	3	3	ESE	0	8	2	2	0	0
25/11/2019	MW	C	1145	1345	1	3	ESE	0	8	2	2	0	0
25/11/2019	MW	C	1145	1345	2	4	ESE	0	8	2	2	0	0
29/11/2019	MW	A	0745	1045	1	1	NE	0	2	2	2	1	0
29/11/2019	MW	A	0745	1045	2	2	NE	0	2	2	2	1	0
29/11/2019	MW	A	0745	1045	3	2	NE	0	3	2	2	1	0
29/11/2019	MW	A	1115	1315	1	3	NE	0	3	2	2	1	0
29/11/2019	MW	A	1115	1315	2	3	NE	0	4	2	2	1	0
02/12/2019	MW	A	0830	1130	1	3	W	0	8	2	2	1	0
02/12/2019	MW	A	0830	1130	2	3	W	0	8	2	2	1	0
02/12/2019	MW	A	0830	1130	3	4	W	2	8	2	2	1	0
02/12/2019	MW	A	1200	1400	1	4	W	2	8	2	2	1	0
02/12/2019	MW	A	1200	1400	2	4	W	2	8	2	2	1	0
12/12/2019	MW	C	0830	1130	1	3	SSE	1	8	0	0	0	0
12/12/2019	MW	C	0830	1130	2	4	SSE	1	8	0	0	0	0
12/12/2019	MW	C	0830	1130	3	5	SSE	4	8	1	1	0	0
12/12/2019	MW	C	0830	1130	4	5	SSE	4	8	0	0	0	0
03/01/2020	MW	C	0830	1130	1	5	NW	0	7	2	2	0	0
03/01/2020	MW	C	0830	1130	2	5	NW	0	7	2	2	0	0

Date	Observer	VP	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
03/01/2020	MW	C	0830	1130	3	6	NW	2	8	2	2	0	0
03/01/2020	MW	C	1200	1400	1	6	NW	0	8	2	2	0	0
03/01/2020	MW	C	1200	1400	2	6	NW	4	8	1	1	0	0
08/01/2020	MW	A	0815	1115	1	6	SW	0	7	2	2	0	0
08/01/2020	MW	A	0815	1115	2	7	SW	0	7	2	2	0	0
08/01/2020	MW	A	0815	1115	3	6	SW	0	7	2	2	0	0
08/01/2020	MW	A	1145	1345	1	6	SW	0	8	2	2	0	0
08/01/2020	MW	A	1145	1345	2	5	SW	0	7	2	2	0	0
03/02/2020	MW	C	0800	1100	1	5	SW	3	7	2	2	0	0
03/02/2020	MW	C	0800	1100	2	5	SW	3	7	2	2	0	0
03/02/2020	MW	C	0800	1100	3	5	WSW	0	6	2	2	0	1
03/02/2020	MW	C	1130	1330	1	6	WSW	0	6	2	2	0	1
03/02/2020	MW	C	1130	1330	2	6	W	2	7	2	2	0	1
17/02/2020	MW	C	0730	1030	1	5	WSW	0	8	2	2	0	1
17/02/2020	MW	C	0730	1030	2	6	WSW	3	8	2	2	0	1
17/02/2020	MW	C	0730	1030	3	6	WSW	0	8	2	2	0	1
17/02/2020	MW	C	1100	1300	1	7	WSW	0	8	2	2	0	1
17/02/2020	MW	C	1100	1300	2	7	WSW	4	8	2	2	0	1
09/03/2020	MW	A	1200	1500	1	5	SW	0	8	2	2	0	1
09/03/2020	MW	A	1200	1500	2	5	SW	3	8	2	2	0	1
09/03/2020	MW	A	1200	1500	3	6	SW	4	8	2	2	0	1
09/03/2020	MW	C	0830	1130	1	4	W	0	8	2	2	0	1
09/03/2020	MW	C	0830	1130	2	4	WSW	3	8	2	2	0	1
09/03/2020	MW	C	0830	1130	3	4	WSW	0	8	2	2	0	1

C.2 Moorland Breeding Bird Surveys

Moorland breeding bird surveys were undertaken during the 2018 and 2019 breeding seasons. **Table C-4** details survey dates and weather data recorded. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-4 Meteorological conditions during breeding bird surveys at Cloud Hill Wind Farm (sorted chronologically)

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
16/04/2018	1	MW	0900	1200	1	6	SW	0	8	2	2	0	0
16/04/2018	1	MW	0900	1200	2	6	SW	0	8	2	2	0	0
16/04/2018	1	MW	0900	1200	3	6	SW	0	8	2	2	0	0
16/04/2018	1	MW	1230	1530	4	6	SW	0	8	2	2	0	0
16/04/2018	1	MW	1230	1530	5	7	SW	0	8	2	2	0	0
16/04/2018	1	MW	1230	1530	6	7	SW	0	8	2	2	0	0
17/04/2018	1	MW	0800	1100	1	5	SSW	4	8	1	1	0	0
17/04/2018	1	MW	0800	1100	2	6	SSW	4	8	1	1	0	0
17/04/2018	1	MW	0800	1100	3	7	SSW	4	8	1	1	0	0
17/04/2018	1	MW	1130	1430	4	7	SSW	4	8	1	1	0	0
17/04/2018	1	MW	1130	1430	5	8	SSW	4	8	1	1	0	0
17/04/2018	1	MW	1130	1430	6	8	SSW	4	8	1	1	0	0
18/04/2018	1	MW	0630	0930	1	5	SSW	1	8	2	2	0	0
18/04/2018	1	MW	0630	0930	2	5	SSW	1	8	2	2	0	0
18/04/2018	1	MW	0630	0930	3	6	SSW	4	8	2	2	0	0
18/04/2018	1	MW	1000	1300	1	6	SSW	4	8	2	2	0	0
18/04/2018	1	MW	1000	1300	2	6	SSW	4	8	2	2	0	0
18/04/2018	1	MW	1000	1300	3	6	SSW	4	8	2	2	0	0
25/05/2018	2	PN	0830	1400	1	2	NE	0	1	2	2	0	0
25/05/2018	2	PN	0830	1400	2	4	NNE	0	2	2	2	0	0
25/05/2018	2	PN	0830	1400	3	4	NNE	0	3	2	2	0	0
25/05/2018	2	PN	0830	1400	4	5	NNE	0	6	2	2	0	0
25/05/2018	2	PN	0830	1400	5	5	NNE	0	6	2	2	0	0
25/05/2018	2	PN	0830	1400	6	4	NNE	0	6	2	2	0	0
28/05/2018	2	PN	0800	1330	1	2	SE	0	2	2	2	0	0
28/05/2018	2	PN	0800	1330	2	2	SE	0	2	2	2	0	0
28/05/2018	2	PN	0800	1330	3	3	SE	0	1	2	2	0	0
28/05/2018	2	PN	0800	1330	4	4	SE	0	3	2	2	0	0
28/05/2018	2	PN	0800	1330	5	3	SE	0	3	2	2	0	0
28/05/2018	2	PN	0800	1330	6	2	SE	0	3	2	2	0	0
13/06/2018	3	MW	0700	1000	1	1	WSW	0	1	2	2	0	0
13/06/2018	3	MW	0700	1000	2	2	WSW	0	2	2	2	0	0
13/06/2018	3	MW	0700	1000	3	3	SSW	0	3	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
13/06/2018	3	MW	1030	1330	1	4	SSW	0	4	2	2	0	0
13/06/2018	3	MW	1030	1330	2	4	S	0	5	2	2	0	0
13/06/2018	3	MW	1030	1330	3	5	S	0	6	2	2	0	0
14/06/2018	3	MW	0630	1230	1	8	SW	0	7	1	1	0	0
14/06/2018	3	MW	0630	1230	2	8	SW	0	7	1	1	0	0
14/06/2018	3	MW	0630	1230	3	9	SW	4	8	1	1	0	0
14/06/2018	3	MW	0630	1230	4	9	SW	4	8	1	1	0	0
14/06/2018	3	MW	0630	1230	5	8	SW	3	8	1	1	0	0
14/06/2018	3	MW	0630	1230	6	8	SW	3	8	1	1	0	0
15/06/2018	3	MW	0600	0900	1	3	SW	0	8	2	2	0	0
15/06/2018	3	MW	0600	0900	2	4	SW	0	8	2	2	0	0
15/06/2018	3	MW	0600	0900	3	5	SW	2	8	2	2	0	0
15/06/2018	3	MW	0930	1230	1	5	SW	0	8	2	2	0	0
15/06/2018	3	MW	0930	1230	2	6	SW	2	8	2	2	0	0
15/06/2018	3	MW	0930	1230	3	6	SW	0	8	2	2	0	0
06/07/2018	4	MW	0630	0930	1	3	W	0	1	2	2	0	0
06/07/2018	4	MW	0630	0930	2	3	W	0	1	2	2	0	0
06/07/2018	4	MW	0630	0930	3	4	W	0	1	2	2	0	0
06/07/2018	4	MW	0630	0930	4	4	W	0	2	2	2	0	0
06/07/2018	4	MW	0630	0930	5	4	W	0	2	2	2	0	0
06/07/2018	4	MW	0630	0930	6	4	W	0	3	2	2	0	0
12/07/2018	4	MW	0630	0930	1	0	N/A	0	8	0	0	0	0
12/07/2018	4	MW	0630	0930	2	1	NE	0	7	1	1	0	0
12/07/2018	4	MW	0630	0930	3	1	NE	0	6	2	2	0	0
12/07/2018	4	MW	1000	1300	1	2	NE	0	5	2	2	0	0
12/07/2018	4	MW	1000	1300	2	2	NE	0	4	2	2	0	0
12/07/2018	4	MW	1000	1300	3	2	NE	0	4	2	2	0	0
13/07/2018	4	MW	0700	1000	1	1	W	0	8	2	2	0	0
13/07/2018	4	MW	0700	1000	2	2	W	0	8	2	2	0	0
13/07/2018	4	MW	0700	1000	3	2	W	0	7	2	2	0	0
13/07/2018	4	MW	1030	1330	1	3	W	0	5	2	2	0	0
13/07/2018	4	MW	1030	1330	2	3	W	0	4	2	2	0	0
13/07/2018	4	MW	1030	1330	3	4	W	0	4	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
23/04/2019	5	MW	0630	1230	1	2	ESE	0	2	2	2	0	0
23/04/2019	5	MW	0630	1230	2	3	ESE	0	2	2	2	0	0
23/04/2019	5	MW	0630	1230	3	3	ESE	0	3	2	2	0	0
23/04/2019	5	MW	0630	1230	4	3	ESE	0	4	2	2	0	0
23/04/2019	5	MW	0630	1230	5	3	ESE	0	3	2	2	0	0
23/04/2019	5	MW	0630	1230	6	4	ESE	0	5	2	2	0	0
24/04/2019	5	MW	0700	1300	1	2	ESE	0	3	2	2	0	0
24/04/2019	5	MW	0700	1300	2	3	ESE	0	1	2	2	0	0
24/04/2019	5	MW	0700	1300	3	4	ESE	0	1	2	2	0	0
24/04/2019	5	MW	0700	1300	4	5	ESE	0	2	2	2	0	0
24/04/2019	5	MW	0700	1300	5	5	ESE	0	2	2	2	0	0
24/04/2019	5	MW	0700	1300	6	6	E	0	3	2	2	0	0
25/04/2019	5	MW	0630	1030	1	4	ESE	0	4	2	2	0	0
25/04/2019	5	MW	0630	1030	2	5	ESE	0	4	2	2	0	0
25/04/2019	5	MW	0630	1030	3	5	ESE	0	4	2	2	0	0
25/04/2019	5	MW	0630	1030	4	5	ESE	0	3	2	2	0	0
26/04/2019	5	MW	0645	1045	1	6	SSE	3	8	2	2	0	0
26/04/2019	5	MW	0645	1045	2	6	SSE	3	8	2	2	0	0
26/04/2019	5	MW	0645	1045	3	6	SSE	3	8	2	2	0	0
26/04/2019	5	MW	0645	1045	4	5	SSE	3	8	2	2	0	0
21/05/2019	6	MW	0620	1220	1	3	NW	0	8	2	2	0	0
21/05/2019	6	MW	0620	1220	2	3	NW	0	7	2	2	0	0
21/05/2019	6	MW	0620	1220	3	4	NW	0	8	2	2	0	0
21/05/2019	6	MW	0620	1220	4	4	NW	0	7	2	2	0	0
21/05/2019	6	MW	0620	1220	5	3	NW	0	6	2	2	0	0
21/05/2019	6	MW	0620	1220	6	3	NW	0	6	2	2	0	0
22/05/2019	6	MW	0630	1230	1	4	WNW	0	1	2	2	0	0
22/05/2019	6	MW	0630	1230	2	4	WNW	0	2	2	2	0	0
22/05/2019	6	MW	0630	1230	3	5	WNW	0	3	2	2	0	0
22/05/2019	6	MW	0630	1230	4	5	WNW	0	3	2	2	0	0
22/05/2019	6	MW	0630	1230	5	6	WNW	0	3	2	2	0	0
22/05/2019	6	MW	0630	1230	6	6	WNW	0	3	2	2	0	0
23/05/2019	6	MW	0600	1000	1	5	WNW	0	3	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
23/05/2019	6	MW	0600	1000	2	5	WNW	0	4	2	2	0	0
23/05/2019	6	MW	0600	1000	3	5	WNW	0	4	2	2	0	0
23/05/2019	6	MW	0600	1000	4	5	WNW	0	4	2	2	0	0
24/05/2019	6	MW	0530	0930	1	4	NW	0	8	2	2	0	0
24/05/2019	6	MW	0530	0930	2	5	NW	0	8	2	2	0	0
24/05/2019	6	MW	0530	0930	3	5	NW	0	8	2	2	0	0
24/05/2019	6	MW	0530	0930	4	5	NW	0	7	2	2	0	0
20/06/2019	7	MW	0700	1300	1	5	WSW	0	3	2	2	0	0
20/06/2019	7	MW	0700	1300	2	6	WSW	0	4	2	2	0	0
20/06/2019	7	MW	0700	1300	3	6	WSW	0	6	2	2	0	0
20/06/2019	7	MW	0700	1300	4	6	WSW	0	7	2	2	0	0
20/06/2019	7	MW	0700	1300	5	6	WSW	0	8	2	2	0	0
20/06/2019	7	MW	0700	1300	6	6	WSW	0	8	2	2	0	0
21/06/2019	7	MW	0430	0630	1	1	W	3	6	2	2	0	0
21/06/2019	7	MW	0430	0630	2	2	WNW	3	6	2	2	0	0
21/06/2019	7	MW	0630	1030	1	3	WNW	3	5	2	2	0	0
21/06/2019	7	MW	0630	1030	2	4	WNW	3	5	2	2	0	0
21/06/2019	7	MW	0630	1030	3	5	WNW	3	4	2	2	0	0
21/06/2019	7	MW	0630	1030	4	4	WNW	0	5	2	2	0	0
24/06/2019	7	MW	0730	1330	1	1	ESE	0	8	2	2	0	0
24/06/2019	7	MW	0730	1330	2	2	ESE	0	8	2	2	0	0
24/06/2019	7	MW	0730	1330	3	3	ESE	3	8	2	2	0	0
24/06/2019	7	MW	0730	1330	4	4	ESE	4	8	2	2	0	0
24/06/2019	7	MW	0730	1330	5	5	E	4	7	2	2	0	0
24/06/2019	7	MW	0730	1330	6	5	E	0	7	2	2	0	0
08/07/2019	8	MW	0730	1330	1	1	SE	0	8	2	2	0	0
08/07/2019	8	MW	0730	1330	2	2	SE	0	8	2	2	0	0
08/07/2019	8	MW	0730	1330	3	3	SSE	0	8	2	2	0	0
08/07/2019	8	MW	0730	1330	4	3	SSE	0	8	2	2	0	0
08/07/2019	8	MW	0730	1330	5	4	SSE	0	8	2	2	0	0
08/07/2019	8	MW	0730	1330	6	4	SSE	0	8	2	2	0	0
09/07/2019	8	MW	0730	1330	1	3	SSW	3	8	1	1	0	0
09/07/2019	8	MW	0730	1330	2	4	SSW	3	8	1	1	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
09/07/2019	8	MW	0730	1330	3	4	SSW	1	8	2	2	0	0
09/07/2019	8	MW	0730	1330	4	4	SSW	0	8	2	2	0	0
09/07/2019	8	MW	0730	1330	5	4	SSW	3	8	2	2	0	0
09/07/2019	8	MW	0730	1330	6	4	SSW	3	8	2	2	0	0
10/07/2019	8	MW	0730	1330	1	3	SSW	0	8	1	1	0	0
10/07/2019	8	MW	0730	1330	2	3	SSW	0	7	2	2	0	0
10/07/2019	8	MW	0730	1330	3	4	SSW	2	6	2	2	0	0
10/07/2019	8	MW	0730	1330	4	4	SSW	0	8	2	2	0	0
10/07/2019	8	MW	0730	1330	5	4	SSW	4	8	2	2	0	0
10/07/2019	8	MW	0730	1330	6	5	SSW	0	7	2	2	0	0

C.3 Winter Walkover Surveys

Winter walkover surveys were undertaken during the 2018/2019 and 2019/2020 non-breeding seasons. **Table C-5** details survey dates and weather data recorded. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-5 Meteorological conditions during winter walkover surveys at Cloud Hill Wind Farm (sorted chronologically)

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
06/11/2018	1	MW	0800	1400	1	6	S	0	8	1	1	0	0
06/11/2018	1	MW	0800	1400	2	6	S	0	8	1	1	0	0
06/11/2018	1	MW	0800	1400	3	7	S	0	8	1	1	0	0
06/11/2018	1	MW	0800	1400	4	7	S	0	8	2	2	0	0
06/11/2018	1	MW	0800	1400	5	7	S	0	8	2	2	0	0
06/11/2018	1	MW	0800	1400	6	7	S	2	8	2	2	0	0
05/12/2018	2	MW	0745	1245	1	3	SW	4	8	2	2	1	0
05/12/2018	2	MW	0745	1245	2	3	SW	4	8	2	2	1	0
05/12/2018	2	MW	0745	1245	3	3	SW	4	8	1	1	1	0
05/12/2018	2	MW	0745	1245	4	4	SW	4	8	1	1	0	0
05/12/2018	2	MW	0745	1245	5	4	SW	4	8	0	0	0	0
06/12/2018	2	MW	0800	1300	1	7	SW	4	8	0	0	0	0
06/12/2018	2	MW	0800	1300	2	7	SW	4	8	0	0	0	0
06/12/2018	2	MW	0800	1300	3	8	SW	4	8	1	1	0	0
06/12/2018	2	MW	0800	1300	4	8	SW	4	8	1	1	0	0
06/12/2018	2	MW	0800	1300	5	8	SW	4	8	1	1	0	0
05/02/2019	3	MW	0935	1035	1	2	SE	0	8	0	0	1	1
05/02/2019	3	MW	1105	1305	1	2	SE	0	8	0	0	1	1
05/02/2019	3	MW	1105	1305	2	2	SE	0	8	0	0	1	1
20/02/2019	3	MW	0730	1230	1	6	SW	4	8	0	0	0	0
20/02/2019	3	MW	0730	1230	2	6	SW	4	8	0	0	0	0
20/02/2019	3	MW	0730	1230	3	6	SW	4	8	0	0	0	0
20/02/2019	3	MW	0730	1230	4	6	SW	4	8	0	0	0	0
20/02/2019	3	MW	0730	1230	5	7	SW	4	8	0	0	0	0
21/02/2019	3	MW	0715	1015	1	6	SW	0	8	0	0	0	0
21/02/2019	3	MW	0715	1015	2	6	SW	0	8	1	1	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
21/02/2019	3	MW	0715	1015	3	6	SW	0	8	1	1	0	0
19/11/2019	4	MW	0845	1345	1	3	ESE	0	8	2	2	1	2
19/11/2019	4	MW	0845	1345	2	3	ESE	0	8	2	2	1	2
19/11/2019	4	MW	0845	1345	3	3	ESE	0	8	2	2	1	2
19/11/2019	4	MW	0845	1345	4	4	ESE	0	8	2	2	1	2
19/11/2019	4	MW	0845	1345	5	4	ESE	0	8	2	2	1	2
20/11/2019	4	MW	0930	1430	1	3	ESE	0	8	2	2	1	0
20/11/2019	4	MW	0930	1430	2	3	ESE	0	8	2	2	1	0
20/11/2019	4	MW	0930	1430	3	4	ESE	0	8	2	2	1	0
20/11/2019	4	MW	0930	1430	4	5	ESE	0	8	2	2	1	0
20/11/2019	4	MW	0930	1430	5	6	ESE	0	8	2	2	0	0
06/01/2020	5	MW	0830	1230	1	9	SSW	4	8	1	1	0	0
06/01/2020	5	MW	0830	1230	2	9	SSW	4	8	1	1	0	0
06/01/2020	5	MW	0830	1230	3	9	SSW	4	8	1	1	0	0
06/01/2020	5	MW	0830	1230	4	9	SSW	4	8	1	1	0	0
07/01/2020	5	MW	0815	1215	1	8	SW	4	8	1	1	0	0
07/01/2020	5	MW	0815	1215	2	9	SW	4	8	1	1	0	0
07/01/2020	5	MW	0815	1215	3	9	SW	4	8	1	1	0	0
07/01/2020	5	MW	0815	1215	4	9	SW	4	8	1	1	0	0
04/02/2020	6	MW	0830	1330	1	5	WNW	0	4	2	2	0	2
04/02/2020	6	MW	0830	1330	2	5	WNW	0	7	2	2	0	2
04/02/2020	6	MW	0830	1330	3	5	WNW	0	6	2	2	0	2
04/02/2020	6	MW	0830	1330	4	5	WNW	0	6	2	2	0	2
04/02/2020	6	MW	0830	1330	5	4	NW	0	6	2	2	0	2
14/02/2020	6	MW	0715	1215	1	5	SSW	0	8	2	2	1	1
14/02/2020	6	MW	0715	1215	2	6	SSW	0	8	2	2	1	1
14/02/2020	6	MW	0715	1215	3	7	SSW	4	8	2	2	1	1
14/02/2020	6	MW	0715	1215	4	7	SSW	4	8	2	2	1	1
14/02/2020	6	MW	0715	1215	5	8	SSW	4	8	1	1	1	1

C.4 Scarce Breeding Bird Surveys

Scarce breeding bird surveys were undertaken during the 2018 and 2019 breeding seasons. **Table C-6** details survey dates and weather data recorded. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-6 Meteorological conditions during scarce breeding bird surveys at Cloud Hill Wind Farm (sorted chronologically)

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
28/03/2018	1	MW	0800	1100	1	4	WNW	0	6	2	2	0	2
28/03/2018	1	MW	0800	1100	2	4	WNW	0	6	2	2	0	2
28/03/2018	1	MW	0800	1100	3	4	WNW	0	7	2	2	0	2
28/03/2018	1	MW	1130	1430	1	5	WNW	0	7	2	2	0	2
28/03/2018	1	MW	1130	1430	2	5	WNW	2	8	2	2	0	2
28/03/2018	1	MW	1130	1430	3	6	WNW	2	8	2	2	0	2
10/04/2018	2	MW	0700	1000	1	5	NE	0	8	2	2	0	0
10/04/2018	2	MW	0700	1000	2	5	NE	0	8	2	2	0	0
10/04/2018	2	MW	0700	1000	3	5	NE	0	8	2	2	0	0
11/04/2018	2	MW	0930	1130	1	5	SE	0	8	2	2	0	0
11/04/2018	2	MW	0930	1130	2	5	SE	0	8	2	2	0	0
23/04/2018	2	MW	0830	1130	1	4	W	0	8	2	2	0	0
23/04/2018	2	MW	0830	1130	2	4	W	0	8	2	2	0	0
23/04/2018	2	MW	0830	1130	3	5	W	0	8	2	2	0	0
23/04/2018	2	MW	1200	1500	1	5	W	0	7	2	2	0	0
23/04/2018	2	MW	1200	1500	2	5	WNW	0	7	2	2	0	0
23/04/2018	2	MW	1200	1500	3	4	W	2	8	2	2	0	0
26/04/2018	2	MW	0830	1130	1	6	SW	3	8	2	2	0	0
26/04/2018	2	MW	0830	1130	2	6	SW	3	8	2	2	0	0
26/04/2018	2	MW	0830	1130	3	6	SW	3	8	2	2	0	0
30/04/2018	2	MW	0930	1230	1	5	N	0	4	2	2	0	0
30/04/2018	2	MW	0930	1230	2	5	N	0	5	2	2	0	0
30/04/2018	2	MW	0930	1230	3	6	N	0	4	2	2	0	0
30/04/2018	2	MW	1300	1600	1	6	N	0	5	2	2	0	0
30/04/2018	2	MW	1300	1600	2	5	N	0	4	2	2	0	0
30/04/2018	2	MW	1300	1600	3	6	N	0	5	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
28/05/2018	3	JR	0750	1350	1	2	ENE	0	1	2	2	0	0
28/05/2018	3	JR	0750	1350	2	2	E	0	1	2	2	0	0
28/05/2018	3	JR	0750	1350	3	2	E	0	1	2	2	0	0
28/05/2018	3	JR	0750	1350	4	2	E	0	1	2	2	0	0
28/05/2018	3	JR	0750	1350	5	1	ENE	0	1	2	2	0	0
28/05/2018	3	JR	0750	1350	6	1	ENE	0	1	2	2	0	0
31/05/2018	3	MW	1000	1300	1	3	NE	0	8	2	2	0	0
31/05/2018	3	MW	1000	1300	2	3	NE	0	8	2	2	0	0
31/05/2018	3	MW	1000	1300	3	3	NE	0	8	2	2	0	0
01/06/2018	3	MW	0700	1000	1	2	SW	0	8	2	2	0	0
01/06/2018	3	MW	0700	1000	2	3	SW	0	8	2	2	0	0
01/06/2018	3	MW	0700	1000	3	3	SW	0	8	2	2	0	0
08/06/2018	4	MW	0700	1000	1	1	NE	0	6	2	2	0	0
08/06/2018	4	MW	0700	1000	2	2	NE	0	7	2	2	0	0
08/06/2018	4	MW	0700	1000	3	2	NE	0	6	2	2	0	0
08/06/2018	4	MW	1030	1330	1	3	NE	0	5	2	2	0	0
08/06/2018	4	MW	1030	1330	2	3	NE	0	5	2	2	0	0
08/06/2018	4	MW	1030	1330	3	3	NE	0	4	2	2	0	0
11/06/2018	4	MW	0730	1030	1	4	NW	0	7	2	2	0	0
11/06/2018	4	MW	0730	1030	2	4	NW	0	6	2	2	0	0
11/06/2018	4	MW	0730	1030	3	4	NW	0	6	2	2	0	0
11/06/2018	4	MW	1100	1400	1	3	NW	0	5	2	2	0	0
11/06/2018	4	MW	1100	1400	2	3	WNW	0	5	2	2	0	0
11/06/2018	4	MW	1100	1400	3	3	WNW	0	4	2	2	0	0
19/06/2018	4	MW	0630	0930	1	5	SW	0	6	2	2	0	0
19/06/2018	4	MW	0630	0930	2	5	SW	0	6	2	2	0	0
19/06/2018	4	MW	0630	0930	3	6	SW	0	6	2	2	0	0
19/06/2018	4	MW	1000	1300	1	6	SW	0	7	2	2	0	0
19/06/2018	4	MW	1000	1300	2	6	SW	0	6	2	2	0	0
19/06/2018	4	MW	1000	1300	3	6	SW	0	7	2	2	0	0
20/06/2018	4	MW	0600	0900	1	5	WNW	4	8	2	2	0	0
20/06/2018	4	MW	0600	0900	2	5	WNW	2	8	2	2	0	0
20/06/2018	4	MW	0600	0900	3	6	WNW	4	8	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
20/06/2018	4	MW	0930	1230	1	6	WNW	0	8	2	2	0	0
20/06/2018	4	MW	0930	1230	2	6	SW	0	7	2	2	0	0
20/06/2018	4	MW	0930	1230	3	5	SW	0	7	2	2	0	0
02/07/2018	5	MW	0630	0930	1	2	NE	0	1	2	2	0	0
02/07/2018	5	MW	0630	0930	2	3	NE	0	1	2	2	0	0
02/07/2018	5	MW	0630	0930	3	3	NE	0	1	2	2	0	0
02/07/2018	5	MW	1000	1300	1	4	NE	0	1	2	2	0	0
02/07/2018	5	MW	1000	1300	2	4	NE	0	1	2	2	0	0
02/07/2018	5	MW	1000	1300	3	4	NE	0	1	2	2	0	0
03/07/2018	5	MW	0630	0930	1	1	WNW	0	0	2	2	0	0
03/07/2018	5	MW	0630	0930	2	2	WNW	0	0	2	2	0	0
03/07/2018	5	MW	0630	0930	3	2	WNW	0	0	2	2	0	0
03/07/2018	5	MW	1000	1300	1	3	WNW	0	0	2	2	0	0
03/07/2018	5	MW	1000	1300	2	4	WNW	0	1	2	2	0	0
03/07/2018	5	MW	1000	1300	3	4	WNW	0	1	2	2	0	0
16/07/2018	5	MW	0730	1030	1	2	W	2	8	2	2	0	0
16/07/2018	5	MW	0730	1030	2	3	W	0	8	2	2	0	0
16/07/2018	5	MW	0730	1030	3	3	W	0	7	2	2	0	0
16/07/2018	5	MW	1100	1400	1	4	W	0	6	2	2	0	0
16/07/2018	5	MW	1100	1400	2	4	W	0	6	2	2	0	0
16/07/2018	5	MW	1100	1400	3	5	W	0	5	2	2	0	0
15/08/2018	6	MW	0700	1000	1	5	SW	1	8	1	1	0	0
15/08/2018	6	MW	0700	1000	2	5	SW	4	8	1	1	0	0
15/08/2018	6	MW	0700	1000	3	5	SW	1	8	2	2	0	0
15/08/2018	6	MW	1030	1330	1	6	SW	0	8	2	2	0	0
15/08/2018	6	MW	1030	1330	2	6	SW	0	7	2	2	0	0
15/08/2018	6	MW	1030	1330	3	7	SW	0	7	2	2	0	0
24/08/2018	6	MW	0800	1100	1	6	W	0	7	2	2	0	0
24/08/2018	6	MW	0800	1100	2	6	W	4	8	1	1	0	0
24/08/2018	6	MW	0800	1100	3	6	W	4	8	2	2	0	0
24/08/2018	6	MW	1130	1430	1	6	W	3	7	2	2	0	0
24/08/2018	6	MW	1130	1430	2	6	W	3	7	1	1	0	0
24/08/2018	6	MW	1130	1430	3	6	W	3	8	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
14/03/2019	7	MW	0800	1400	1	8	WNW	0	7	2	2	0	0
14/03/2019	7	MW	0800	1400	2	8	WNW	3	6	2	2	0	0
14/03/2019	7	MW	0800	1400	3	9	WNW	3	8	2	2	0	0
14/03/2019	7	MW	0800	1400	4	9	WNW	3	8	2	2	0	0
14/03/2019	7	MW	0800	1400	5	9	WNW	4	8	2	2	0	0
14/03/2019	7	MW	0800	1400	6	9	WNW	4	8	2	2	0	0
18/03/2019	7	MW	0700	1300	1	2	WNW	2	8	2	2	0	2
18/03/2019	7	MW	0700	1300	2	2	WSW	2	8	2	2	0	2
18/03/2019	7	MW	0700	1300	3	3	WSW	2	8	2	2	0	2
18/03/2019	7	MW	0700	1300	4	3	WSW	2	8	2	2	0	2
18/03/2019	7	MW	0700	1300	5	4	WSW	4	8	2	2	0	2
18/03/2019	7	MW	0700	1300	6	4	WSW	4	8	2	2	0	2
04/04/2019	8	MW	0645	1145	1	2	E	4	8	2	2	0	1
04/04/2019	8	MW	0645	1145	2	2	E	3	8	1	1	0	1
04/04/2019	8	MW	0645	1145	3	2	E	3	8	1	1	0	1
04/04/2019	8	MW	0645	1145	4	2	E	2	8	1	1	0	1
04/04/2019	8	MW	0645	1145	5	2	E	2	8	1	1	0	1
29/04/2019	8	MW	0700	1300	1	3	SE	0	8	1	1	0	0
29/04/2019	8	MW	0700	1300	2	3	SE	0	7	2	2	0	0
29/04/2019	8	MW	0700	1300	3	3	SE	0	7	2	2	0	0
29/04/2019	8	MW	0700	1300	4	4	SE	0	6	2	2	0	0
29/04/2019	8	MW	0700	1300	5	4	SE	0	6	2	2	0	0
29/04/2019	8	MW	0700	1300	6	4	SE	0	5	2	2	0	0
30/04/2019	8	MW	0630	1230	1	5	S	0	8	2	2	0	0
30/04/2019	8	MW	0630	1230	2	5	S	0	8	2	2	0	0
30/04/2019	8	MW	0630	1230	3	5	S	0	8	2	2	0	0
30/04/2019	8	MW	0630	1230	4	6	S	0	8	2	2	0	0
30/04/2019	8	MW	0630	1230	5	6	SSE	0	8	2	2	0	0
30/04/2019	8	MW	0630	1230	6	6	SSE	0	8	2	2	0	0
15/05/2019	9	MW	0630	1230	1	2	SSE	0	1	2	2	0	0
15/05/2019	9	MW	0630	1230	2	2	SSE	0	1	2	2	0	0
15/05/2019	9	MW	0630	1230	3	3	SSE	0	1	2	2	0	0
15/05/2019	9	MW	0630	1230	4	3	SSE	0	1	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
15/05/2019	9	MW	0630	1230	5	3	SSE	0	1	2	2	0	0
15/05/2019	9	MW	0630	1230	6	4	SSE	0	1	2	2	0	0
16/05/2019	9	MW	0645	1245	1	1	SSE	0	3	2	2	0	0
16/05/2019	9	MW	0645	1245	2	2	SSE	0	2	2	2	0	0
16/05/2019	9	MW	0645	1245	3	2	SSE	0	3	2	2	0	0
16/05/2019	9	MW	0645	1245	4	3	SSE	0	4	2	2	0	0
16/05/2019	9	MW	0645	1245	5	4	SSE	0	5	2	2	0	0
16/05/2019	9	MW	0645	1245	6	5	SSE	0	6	2	2	0	0
17/05/2019	9	MW	0630	1230	1	2	ENE	0	7	2	2	0	0
17/05/2019	9	MW	0630	1230	2	3	ENE	0	8	2	2	0	0
17/05/2019	9	MW	0630	1230	3	3	ENE	0	8	2	2	0	0
17/05/2019	9	MW	0630	1230	4	4	ENE	0	8	2	2	0	0
17/05/2019	9	MW	0630	1230	5	4	ENE	0	8	2	2	0	0
17/05/2019	9	MW	0630	1230	6	4	ENE	0	8	2	2	0	0
03/06/2019	10	MW	0730	1330	1	6	SW	0	8	2	2	0	0
03/06/2019	10	MW	0730	1330	2	6	SW	0	8	2	2	0	0
03/06/2019	10	MW	0730	1330	3	6	SW	0	8	2	2	0	0
03/06/2019	10	MW	0730	1330	4	6	SW	0	8	2	2	0	0
03/06/2019	10	MW	0730	1330	5	6	SW	0	8	2	2	0	0
03/06/2019	10	MW	0730	1330	6	7	SW	0	8	2	2	0	0
04/06/2019	10	MW	0700	1300	1	2	SSE	0	8	2	2	0	0
04/06/2019	10	MW	0700	1300	2	2	SSE	0	8	2	2	0	0
04/06/2019	10	MW	0700	1300	3	3	SSE	0	7	2	2	0	0
04/06/2019	10	MW	0700	1300	4	3	SSE	0	8	2	2	0	0
04/06/2019	10	MW	0700	1300	5	3	SSE	0	8	2	2	0	0
04/06/2019	10	MW	0700	1300	6	4	SSE	0	8	2	2	0	0
25/06/2019	10	MW	0730	1330	1	1	NE	0	8	2	2	0	0
25/06/2019	10	MW	0730	1330	2	2	NE	0	8	2	2	0	0
25/06/2019	10	MW	0730	1330	3	3	NE	0	8	2	2	0	0
25/06/2019	10	MW	0730	1330	4	4	NE	0	8	2	2	0	0
25/06/2019	10	MW	0730	1330	5	5	NE	0	8	2	2	0	0
25/06/2019	10	MW	0730	1330	6	6	NE	0	7	2	2	0	0
26/06/2019	10	MW	0715	1315	1	1	NE	0	8	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
26/06/2019	10	MW	0715	1315	2	2	NE	0	8	2	2	0	0
26/06/2019	10	MW	0715	1315	3	2	NE	0	8	2	2	0	0
26/06/2019	10	MW	0715	1315	4	3	NE	0	7	2	2	0	0
26/06/2019	10	MW	0715	1315	5	3	NE	0	7	2	2	0	0
26/06/2019	10	MW	0715	1315	6	4	NE	0	6	2	2	0	0
15/07/2019	11	MW	0745	1345	1	2	SW	0	2	2	2	0	0
15/07/2019	11	MW	0745	1345	2	3	SW	0	3	2	2	0	0
15/07/2019	11	MW	0745	1345	3	3	SW	0	3	2	2	0	0
15/07/2019	11	MW	0745	1345	4	3	SW	0	4	2	2	0	0
15/07/2019	11	MW	0745	1345	5	4	SW	0	4	2	2	0	0
15/07/2019	11	MW	0745	1345	6	4	SW	0	5	2	2	0	0
16/07/2019	11	MW	0700	1300	1	2	S	0	8	1	1	0	0
16/07/2019	11	MW	0700	1300	2	3	S	0	8	2	2	0	0
16/07/2019	11	MW	0700	1300	3	4	SSW	0	8	2	2	0	0
16/07/2019	11	MW	0700	1300	4	4	SW	0	8	2	2	0	0
16/07/2019	11	MW	0700	1300	5	4	SW	0	7	2	2	0	0
16/07/2019	11	MW	0700	1300	6	5	SW	0	7	2	2	0	0
17/07/2019	11	MW	0700	1300	1	4	SSW	0	8	1	1	0	0
17/07/2019	11	MW	0700	1300	2	5	SSW	0	8	1	1	0	0
17/07/2019	11	MW	0700	1300	3	5	SSW	3	8	2	2	0	0
17/07/2019	11	MW	0700	1300	4	5	SSW	2	8	2	2	0	0
17/07/2019	11	MW	0700	1300	5	5	SSW	0	8	2	2	0	0
17/07/2019	11	MW	0700	1300	6	5	SSW	2	8	2	2	0	0
07/08/2019	12	MW	0700	1300	1	4	W	0	8	2	2	0	0
07/08/2019	12	MW	0700	1300	2	4	W	0	8	2	2	0	0
07/08/2019	12	MW	0700	1300	3	5	WSW	0	7	2	2	0	0
07/08/2019	12	MW	0700	1300	4	5	WSW	0	8	2	2	0	0
07/08/2019	12	MW	0700	1300	5	5	WSW	3	8	2	2	0	0
07/08/2019	12	MW	0700	1300	6	5	WSW	3	8	2	2	0	0
08/08/2019	12	MW	0500	1100	1	2	W	0	8	2	2	0	0
08/08/2019	12	MW	0500	1100	2	2	W	0	8	2	2	0	0
08/08/2019	12	MW	0500	1100	3	2	W	0	7	2	2	0	0
08/08/2019	12	MW	0500	1100	4	3	W	0	7	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
08/08/2019	12	MW	0500	1100	5	3	W	0	7	2	2	0	0
08/08/2019	12	MW	0500	1100	6	3	W	0	6	2	2	0	0

C.5 Black Grouse Surveys

Black grouse surveys were undertaken during the 2018 and 2019 breeding seasons. **Table C-7** details survey dates and weather data recorded. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-7 Meteorological conditions during black grouse surveys at Cloud Hill Wind Farm (sorted chronologically)

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
26/04/2018	1	MW	0500	0800	1	6	SW	0	7	2	2	0	0
26/04/2018	1	MW	0500	0800	2	6	SW	3	8	2	2	0	0
26/04/2018	1	MW	0500	0800	3	7	SW	3	8	2	2	0	0
31/05/2018	2	MW	0630	0930	1	1	NE	0	8	1	1	0	0
31/05/2018	2	MW	0630	0930	2	1	NE	0	8	1	1	0	0
31/05/2018	2	MW	0630	0930	3	2	NE	0	8	2	2	0	0
01/06/2018	2	MW	0330	0630	1	1	SW	0	8	1	1	0	0
01/06/2018	2	MW	0330	0630	2	2	SW	0	8	2	2	0	0
01/06/2018	2	MW	0330	0630	3	2	SW	0	8	2	2	0	0
25/04/2019	3	MW	0430	0630	1	4	ESE	0	5	2	2	0	0
25/04/2019	3	MW	0430	0630	2	4	ESE	0	4	2	2	0	0
26/04/2019	3	MW	0445	0645	1	5	SSE	4	8	2	2	0	0
26/04/2019	3	MW	0445	0645	2	5	SSE	3	8	2	2	0	0
23/05/2019	4	MW	0400	0600	1	4	WNW	0	3	2	2	0	0
23/05/2019	4	MW	0400	0600	2	4	WNW	0	3	2	2	0	0
24/05/2019	4	MW	0330	0530	1	4	NW	0	8	2	2	0	0
24/05/2019	4	MW	0330	0530	2	4	NW	0	8	2	2	0	0

ANNEX D. ORNITHOLOGICAL SURVEY RESULTS

D.1 Flight Activity Records: Target Species

In accordance with NatureScot guidance (SNH 2017), target species are those which may be considered to be at risk from the potential effects of wind farms. All flights of target species within the turbine area and the surrounding area were mapped and are detailed in **Table D-1.**

Table D-1 Details of target species recorded during flight activity surveys (sorted by species)

Date	Observer	VP	Flight start time	Species	No. of birds	Duration (s)	Inside CRAA (seconds)					Outside CRAA (seconds)				
							0-20m	21-40m	41-100m	101-150m	>150m	0-20m	21-40m	41-100m	101-150m	>150m
05/06/2019	MW	1	1124	Black grouse	4	16	1.25	0	0	0	0	14.75	0	0	0	0
21/10/2019	MW	1	0820	Black grouse	2	22	12.18	0	0	0	0	9.82	0	0	0	0
29/03/2018	MW	1	0940	Curlew	3	45	0	8.93	0	0	0	0	36.07	0	0	0
29/03/2018	MW	1	1200	Curlew	2	30	30.00	0	0	0	0	0	0	0	0	0
02/04/2018	MW	1	1025	Curlew	2	12	0	0	0	0	0	12.00	0	0	0	0
09/04/2018	MW	1	0810	Curlew	2	28	5.92	0	0	0	0	22.08	0	0	0	0
10/04/2018	MW	2	1250	Curlew	2	35	22.52	0	0	0	0	12.48	0	0	0	0
02/05/2018	MW	1	1200	Curlew	2	27	8.02	0	0	0	0	18.98	0	0	0	0
07/06/2018	MW	2	0550	Curlew	1	45	32.98	0	0	0	0	12.02	0	0	0	0
07/06/2018	MW	2	0615	Curlew	1	75	59.49	0	0	0	0	15.51	0	0	0	0
07/06/2018	MW	2	0700	Curlew	1	70	0	0	0	0	0	70.00	0	0	0	0
07/06/2018	MW	2	1112	Curlew	1	60	44.76	0	0	0	0	15.24	0	0	0	0
12/06/2018	MW	1	0708	Curlew	1	45	0	0	0	0	0	45.00	0	0	0	0
12/06/2018	MW	1	0740	Curlew	1	50	0	0	0	0	0	50.00	0	0	0	0
12/06/2018	MW	1	1055	Curlew	1	70	0	0	0	0	0	70.00	0	0	0	0
12/06/2018	MW	1	1214	Curlew	1	65	62.56	0	0	0	0	2.44	0	0	0	0
18/06/2018	MW	1	0917	Curlew	1	40	23.11	0	0	0	0	16.89	0	0	0	0
18/06/2018	MW	1	1052	Curlew	1	45	0	0	0	0	0	45.00	0	0	0	0
18/06/2018	MW	1	1307	Curlew	1	40	0	0	0	0	0	40.00	0	0	0	0
20/03/2019	MW	2	0800	Curlew	2	35	33.09	0	0	0	0	1.91	0	0	0	0
20/03/2019	MW	2	0840	Curlew	2	50	44.77	0	0	0	0	5.23	0	0	0	0
18/04/2019	MW	1	1050	Curlew	2	60	42.06	0	0	0	0	17.94	0	0	0	0

Date	Observer	VP	Flight start time	Species	No. of birds	Duration (s)	Inside CRAA (seconds)					Outside CRAA (seconds)				
							0-20m	21-40m	41-100m	101-150m	>150m	0-20m	21-40m	41-100m	101-150m	>150m
03/05/2019	MW	1	1159	Curlew	1	45	13.83	0	0	0	0	31.17	0	0	0	0
03/05/2019	MW	1	1250	Curlew	1	30	0	0	0	0	0	30.00	0	0	0	0
29/05/2019	MW	2	0700	Curlew	1	33	33.00	0	0	0	0	0	0	0	0	0
29/05/2019	MW	2	1014	Curlew	1	35	21.80	0	0	0	0	13.20	0	0	0	0
05/06/2019	MW	1	0850	Curlew	1	45	45.00	0	0	0	0	0	0	0	0	0
05/06/2019	MW	1	1015	Curlew	1	50	50.00	0	0	0	0	0	0	0	0	0
28/06/2019	MW	2	1112	Curlew	1	48	22.38	10.17	0	0	0	10.62	4.83	0	0	0
03/10/2018	MW	1	1114	Golden plover	1	32	0	12.70	0	0	0	0	19.30	0	0	0
08/01/2019	MW	1	1030	Golden plover	33	35	35.00	0	0	0	0	0	0	0	0	0
09/01/2019	MW	2	1211	Golden plover	44	30	30.00	0	0	0	0	0	0	0	0	0
21/10/2019	MW	1	1000	Golden plover	3	60	0	36.10	0	0	0	0	23.90	0	0	0
03/10/2018	MW	1	1216	Goshawk	1	66	0	0	0	0	0	30.00	36.00	0	0	0
29/03/2018	MW	1	0830	Hen harrier	1	50	0	0	0	0	0	50.00	0	0	0	0
29/03/2018	MW	1	1015	Hen harrier	1	75	18.32	0	0	0	0	56.68	0	0	0	0
27/08/2018	MW	2	0715	Hen harrier	1	45	0	0	0	0	0	45.00	0	0	0	0
27/08/2018	MW	2	0734	Hen harrier	1	50	0	0	0	0	0	50.00	0	0	0	0
14/09/2018	MW	1	1025	Hen harrier	1	80	5.70	0	0	0	0	74.30	0	0	0	0
14/09/2018	MW	1	1118	Hen harrier	1	150	137.77	0	0	0	0	12.23	0	0	0	0
07/02/2019	MW	1	0941	Hen harrier	1	48	32.58	0	0	0	0	15.42	0	0	0	0
14/10/2019	MW	2	1140	Hen harrier	1	105	103.87	0	0	0	0	1.13	0	0	0	0
08/01/2020	MW	1	1202	Hen harrier	1	150	0	0	0	0	0	30.00	105.00	15.00	0	0
09/03/2020	MW	2	1000	Hen harrier	1	75	59.22	0	0	0	0	15.78	0	0	0	0
29/03/2018	MW	1	1301	Merlin	1	40	34.11	0	0	0	0	5.89	0	0	0	0
14/09/2018	MW	1	1120	Merlin	1	30	30.00	0	0	0	0	0	0	0	0	0
25/02/2019	MW	2	0912	Merlin	1	32	27.19	0	0	0	0	4.81	0	0	0	0
14/08/2018	MW	2	0951	Osprey	1	180	60.26	20.09	0	0	0	74.74	24.91	0	0	0
29/03/2018	MW	1	0801	Peregrine falcon	1	46	13.32	24.97	0	0	0	2.68	5.03	0	0	0
14/09/2018	MW	1	1200	Peregrine falcon	1	32	21.88	0	0	0	0	10.12	0	0	0	0
05/06/2019	MW	1	0837	Peregrine falcon	1	35	0	16.62	0	0	0	0	18.38	0	0	0
19/03/2019	MW	1	0904	Pink-footed goose	188	65	0	0	0	37.08	0	0	0	0	27.92	0
19/03/2019	MW	1	1022	Pink-footed goose	270	75	0	0	0	55.00	0	0	0	0	20.00	0

Date	Observer	VP	Flight start time	Species	No. of birds	Duration (s)	Inside CRAA (seconds)					Outside CRAA (seconds)				
							0-20m	21-40m	41-100m	101-150m	>150m	0-20m	21-40m	41-100m	101-150m	>150m
19/03/2019	MW	1	1111	Pink-footed goose	48	60	0	0	0	0	0	0	0	30.00	30.00	0
18/04/2019	MW	1	0917	Pink-footed goose	85	70	0	0	13.64	0	0	0	0	56.36	0	0
29/03/2018	MW	1	1135	Red kite	1	45	0	0	0	0	0	0	30.00	15.00	0	0
10/04/2018	MW	2	1214	Red kite	1	45	0	9.70	0	0	0	0	35.30	0	0	0
02/05/2018	MW	1	1114	Red kite	1	60	0	0	0	0	0	15.00	45.00	0	0	0
18/06/2018	MW	1	0838	Red kite	1	55	32.09	0	0	0	0	22.91	0	0	0	0
03/10/2018	MW	1	1035	Red kite	1	65	28.30	24.26	0	0	0	6.70	5.74	0	0	0
21/10/2019	MW	1	1020	Red kite	1	30	0	21.57	0	0	0	0	8.43	0	0	0
09/03/2020	MW	2	0938	Red kite	1	90	11.36	56.81	0	0	0	3.64	18.19	0	0.00	0

D.2 Flight Activity Records: Secondary Species

Table D-2 details secondary species recorded per season during flight activity surveys. Secondary species were recorded to give an indication of the use of the site by these species. Refer to **Annex B** for survey methodology and **Annex C** for weather data.

Table D-2 Summary of secondary species recorded during flight activity surveys

Species	2018 breeding season		2018/2019 non-breeding season		2019 breeding season		2019/2020 non-breeding season	
	No. of records	No. of birds	No. of records	No. of birds	No. of records	No. of birds	No. of records	No. of birds
Buzzard	7	17	4	9	2	2	-	-
Kestrel	10	10	2	-	3	3	3	3
Lesser black-backed gull	2	3	1	1	-	-	-	-
Red grouse	-	-	1	1	-	-	-	-
Snipe	-	-	4	9	-	-	-	-
Sparrowhawk	-	-	1	1	-	-	-	-

D.3 Moorland Breeding Bird Records

Moorland breeding bird surveys were undertaken during the 2019 and 2020 breeding seasons and focussed on recording activity of upland wader species within the survey area (**Table D-3**). Survey methodology is detailed in **Annex B** and survey timing/weather conditions in **Annex C.**

Table D-3 Wader activity recorded during moorland breeding bird surveys

Date	Observer	Survey visit	Species	Number recorded	Notes
16/04/2018	MW	1	Curlew	2	
16/04/2018	MW	1	Curlew	1	
16/04/2018	MW	1	Curlew	1	
16/04/2018	MW	1	Curlew	1	
16/04/2018	MW	1	Curlew	1	
16/04/2018	MW	1	Curlew	1	
16/04/2018	MW	1	Snipe	1	
25/05/2018	PN	2	Curlew	1	Calling
25/05/2018	PN	2	Curlew	2	Pair displaying/calling
25/05/2018	PN	2	Curlew	1	Calling
25/05/2018	PN	2	Curlew	2	Calling
25/05/2018	PN	2	Curlew	2	Pair displaying/calling
25/05/2018	PN	2	Curlew	1	
25/05/2018	PN	2	Curlew	2	Calling displaying
25/05/2018	PN	2	Curlew	1	Calling displaying
25/05/2018	PN	2	Snipe	1	Calling
28/05/2018	PN	2	Curlew	2	Displaying
28/05/2018	PN	2	Curlew	2	Pair
28/05/2018	PN	2	Curlew	2	Pair
28/05/2018	PN	2	Curlew	1	
23/04/2019	MW	5	Curlew	1	
23/04/2019	MW	5	Curlew	1	
23/04/2019	MW	5	Curlew	1	
23/04/2019	MW	5	Curlew	1	
23/04/2019	MW	5	Curlew	1	
23/04/2019	MW	5	Snipe	1	
23/04/2019	MW	5	Snipe	1	
23/04/2019	MW	5	Snipe	1	
23/04/2019	MW	5	Snipe	1	
23/04/2019	MW	5	Snipe	1	
24/04/2019	MW	5	Curlew	1	
24/04/2019	MW	5	Snipe	-	
21/05/2019	MW	6	Common sandpiper	1	Calling
21/05/2019	MW	6	Common sandpiper	1	Calling
21/05/2019	MW	6	Curlew	1	
21/05/2019	MW	6	Curlew	1	Calling
21/05/2019	MW	6	Curlew	1	Calling
21/05/2019	MW	6	Snipe	1	
21/05/2019	MW	6	Snipe	1	
21/05/2019	MW	6	Snipe	1	
22/05/2019	MW	6	Curlew	1	
22/05/2019	MW	6	Curlew	1	

22/05/2019	MW	6	Curlew	1	
22/05/2019	MW	6	Snipe	1	
22/05/2019	MW	6	Snipe	1	
22/05/2019	MW	6	Snipe	1	
22/05/2019	MW	6	Snipe	1	
23/05/2019	MW	6	Common sandpiper	1	
23/05/2019	MW	6	Common sandpiper	1	
23/05/2019	MW	6	Common sandpiper	1	
23/05/2019	MW	6	Curlew	1	
23/05/2019	MW	6	Curlew	1	Calling
23/05/2019	MW	6	Curlew	1	Calling
23/05/2019	MW	6	Curlew	1	
23/05/2019	MW	6	Curlew	1	
23/05/2019	MW	6	Curlew	1	
23/05/2019	MW	6	Lapwing	1	
23/05/2019	MW	6	Snipe	1	
23/05/2019	MW	6	Snipe	1	
23/05/2019	MW	6	Woodcock	1	
23/05/2019	MW	6	Woodcock	1	
24/05/2019	MW	6	Common sandpiper	4	
24/05/2019	MW	6	Curlew	1	
24/05/2019	MW	6	Lapwing	-	
24/05/2019	MW	6	Snipe	-	
20/06/2019	MW	7	Common sandpiper	1	
20/06/2019	MW	7	Curlew	1	
20/06/2019	MW	7	Curlew	1	
20/06/2019	MW	7	Curlew	1	
20/06/2019	MW	7	Lapwing	1	
20/06/2019	MW	7	Snipe	1	
20/06/2019	MW	7	Snipe	1	
21/06/2019	MW	7	Curlew	1	
21/06/2019	MW	7	Snipe	1	
21/06/2019	MW	7	Snipe	1	
24/06/2019	MW	7	Curlew	1	
24/06/2019	MW	7	Curlew	1	
24/06/2019	MW	7	Lapwing	1	
24/06/2019	MW	7	Snipe	1	
24/06/2019	MW	7	Snipe	1	
24/06/2019	MW	7	Snipe	1	
08/07/2019	MW	8	Common sandpiper	1	
08/07/2019	MW	8	Common sandpiper	1	
08/07/2019	MW	8	Curlew	1	
08/07/2019	MW	8	Curlew	1	
08/07/2019	MW	8	Snipe	1	
08/07/2019	MW	8	Snipe	1	
10/07/2019	MW	8	Lapwing	2	

D.4 Winter Walkover Records

Table D-4 details all the species recorded. Refer to **Annex B** for survey methodology and **Annex C** for weather data.

Table D-4 Winter walkover survey records: 2018/2019 and 2019/2020 non-breeding seasons

Date	Observer	Survey visit	Species	Number recorded	Notes
06/11/2018	MW	1	Blackbird	10	Minimum count
06/11/2018	MW	1	Blue tit	4	
06/11/2018	MW	1	Carrion crow	-	
06/11/2018	MW	1	Common crossbill	30	
06/11/2018	MW	1	Dipper	-	
06/11/2018	MW	1	Dunnock	10	Minimum count
06/11/2018	MW	1	Fieldfare	180	
06/11/2018	MW	1	Great spotted woodpecker	3	
06/11/2018	MW	1	Great tit	6	
06/11/2018	MW	1	Lesser redpoll	6	
06/11/2018	MW	1	Long-tailed tit	-	
06/11/2018	MW	1	Nuthatch	4	
06/11/2018	MW	1	Redwing	20	
06/11/2018	MW	1	Reed bunting	4	
06/11/2018	MW	1	Robin	15	Minimum count
06/11/2018	MW	1	Snipe	1	
06/11/2018	MW	1	Snipe	1	
06/11/2018	MW	1	Snipe	1	
06/11/2018	MW	1	Snipe	1	
06/11/2018	MW	1	Snipe	1	
06/11/2018	MW	1	Snipe	1	
06/11/2018	MW	1	Woodpigeon	-	
06/11/2018	MW	1	Wren	15	Minimum count
05/12/2018	MW	2	Dipper	-	
05/12/2018	MW	2	Meadow pipit	6	
05/12/2018	MW	2	Reed bunting	-	
05/12/2018	MW	2	Snipe	1	
05/12/2018	MW	2	Snipe	1	
05/12/2018	MW	2	Woodpigeon	-	
06/12/2018	MW	2	Carrion crow	-	
06/12/2018	MW	2	Snipe	1	
06/12/2018	MW	2	Snipe	1	
06/12/2018	MW	2	Woodpigeon	-	
20/02/2019	MW	3	Snipe	1	
20/02/2019	MW	3	Snipe	1	
20/02/2019	MW	3	Snipe	1	
19/11/2019	MW	4	Red kite	1	
20/11/2019	MW	4	Red kite	1	
06/01/2020	MW	5	Buzzard	2	
06/01/2020	MW	5	Carrion crow	-	
07/01/2020	MW	5	Carrion crow	-	
07/01/2020	MW	5	Fieldfare	15	
04/02/2020	MW	6	Buzzard	-	
04/02/2020	MW	6	Carrion crow	-	
04/02/2020	MW	6	Chaffinch	-	
04/02/2020	MW	6	Coal tit	-	
04/02/2020	MW	6	Common crossbill	10	

Date	Observer	Survey visit	Species	Number recorded	Notes
04/02/2020	MW	6	Goldfinch	8	
04/02/2020	MW	6	Kestrel	-	
04/02/2020	MW	6	Meadow pipit	3	
04/02/2020	MW	6	Raven	-	
04/02/2020	MW	6	Reed bunting	6	
04/02/2020	MW	6	Skylark	4	
04/02/2020	MW	6	Woodpigeon	-	
14/02/2020	MW	6	Common crossbill	10	

D.5 Scarce Breeding Bird Records

Table D-5 details all records of raptors and owls recorded during surveys, however only Annex 1[1] or Schedule 1[2] species are considered to be scarce breeding birds (i.e. target species). Refer to **Annex B** for survey methodology, **Annex C** for weather data and **Confidential Technical Appendix 8.2** for confidential data relating to barn owl and peregrine falcon.

Table D-5 Raptor and owl records: 2018 and 2019 breeding seasons

Date	Species	Number recorded	Sex	Age	Nest ID	Notes
28/03/2018	Buzzard	-	-	-	-	
28/03/2018	Kestrel	1	-	-	-	
29/03/2018	Buzzard	7	-	-	-	Minimum count. Circling flight north east from Cloud Hill along Birk Burn and then back south west past Mid Rig
29/03/2018	Buzzard	1	-	-	-	Circling flight south out of Ulzieside Plantation to Whing and then back
02/04/2018	Buzzard	1	-	-	-	
09/04/2018	Buzzard	3	-	-	-	
03/05/2018	Buzzard	2	-	-	-	
03/05/2018	Buzzard	2	-	-	-	
27/08/2018	Buzzard	1	-	-	-	Circling flight between Collar Knowe and Cloud Hill
10/04/2018	Buzzard	-	-	-	-	
10/04/2018	Kestrel	-	-	-	-	
11/04/2018	Buzzard	2	-	-	-	
11/04/2018	Kestrel	2	-	-	-	
11/04/2018	Sparrowhawk	1	-	-	-	
16/04/2018	Buzzard	1	-	-	-	
16/04/2018	Hen harrier	1	Male	Adult	-	Male hunting
16/04/2018	Kestrel	2	-	-	-	
16/04/2018	Peregrine falcon	1	-	Adult	-	
18/04/2018	Buzzard	1	-	-	-	
18/04/2018	Kestrel	1	-	-	-	
23/04/2018	Buzzard	2	-	-	-	
23/04/2018	Kestrel	2	-	-	-	
26/04/2018	Buzzard	3	-	-	-	
26/04/2018	Kestrel	1	-	-	-	
26/04/2018	Tawny owl	2	-	-	-	

[1] Annex 1 of the EU Bird Directive
[2] Schedule 1 of the Wildlife and Countryside Act 1981, as amended by the Nature Conservation Act (Scotland) 2004

Date	Species	Number recorded	Sex	Age	Nest ID	Notes
30/04/2018	Buzzard	2	-	-	-	
30/04/2018	Kestrel	2	-	-	-	
28/06/2019	Buzzard	1	-	-	-	In flight. Water works
12/08/2019	Buzzard	1	-	-	-	In flight. Cramley Knlwes
25/05/2018	Buzzard	-	-	-	-	
25/05/2018	Buzzard	-	-	-	-	
25/05/2018	Kestrel	-	-	-	-	
28/05/2018	Buzzard	-	-	-	-	
28/05/2018	Peregrine falcon	1	-	Adult	-	
28/05/2018	Red kite	1	-	Adult	-	
31/05/2018	Buzzard	2	-	-	-	
31/05/2018	Kestrel	2	-	-	-	
01/06/2018	Hen harrier	1	Female	Adult	-	Female
08/06/2018	Barn owl	1	-	Adult	BO_1	Roosting in [redacted]. No sign of nesting though very suitable
08/06/2018	Buzzard	3	-	-	-	
08/06/2018	Kestrel	3	-	-	-	
11/06/2018	Buzzard	3	-	-	-	
11/06/2018	Kestrel	2	-	-	-	
19/06/2018	Buzzard	3	-	-	-	
19/06/2018	Kestrel	2	-	-	-	
19/06/2018	Red kite	1	-	Adult	-	
20/06/2018	Buzzard	4	-	-	-	Minimum count
20/06/2018	Kestrel	2	-	-	-	
06/07/2018	Buzzard	1	-	-	-	
06/07/2018	Kestrel	1	-	-	-	
12/07/2018	Buzzard	1	-	-	-	
12/07/2018	Kestrel	1	-	-	-	
13/07/2018	Buzzard	3	-	-	-	
13/07/2018	Kestrel	2	-	-	-	
15/08/2018	Buzzard	1	-	-	-	
15/08/2018	Kestrel	1	-	-	-	
15/08/2018	Red kite	1	-	Adult	-	
24/08/2018	Buzzard	1	-	-	-	
24/08/2018	Kestrel	1	-	-	-	
29/03/2018	Kestrel	1	-	-	-	Circling flight from foresty of Ulzieside Plantation to Great Craigiedhu
29/03/2018	Kestrel	1	-	-	-	Circling flight west over Cramley Burn then back east past Whing
02/04/2018	Kestrel	1	-	-	-	
09/04/2018	Kestrel	1	-	-	-	
10/04/2018	Kestrel	1	-	-	-	
02/05/2018	Kestrel	1	-	-	-	Hunting east of Earl's Seat
03/05/2018	Kestrel	1	-	-	-	
07/06/2018	Kestrel	1	-	-	-	Hunting
12/06/2018	Kestrel	1	-	-	-	
18/06/2018	Kestrel	1	-	-	-	Hunting in a circling northerly flight up Cramley Burn
09/03/2020	Kestrel	1	-	-	-	In flight. Little Hill
23/04/2019	Sparrowhawk	1	-	-	-	
29/04/2019	Buzzard	-	-	-	-	
29/04/2019	Peregrine falcon	1	-	Adult	PE_1	Sitting on eggs

Date	Species	Number recorded	Sex	Age	Nest ID	Notes
30/04/2019	Kestrel	1	-	-	-	
30/04/2019	Kestrel	1	-	-	-	
16/05/2019	Buzzard	-	-	-	-	
17/05/2019	Buzzard	1	-	-	-	
23/05/2019	Peregrine falcon	1	-	Adult	PE_2	Alarm calling from nest area
24/05/2019	Buzzard	1	-	-	-	
03/06/2019	Buzzard	1	-	-	-	
03/06/2019	Kestrel	1	-	-	-	
04/06/2019	Buzzard	1	-	-	-	
04/06/2019	Peregrine falcon	1	-	Adult	PE_2	Adult on nest
04/06/2019	Red kite	1	-	Adult	-	1117: height band 2, 64 seconds
20/06/2019	Buzzard	1	-	-	-	
20/06/2019	Peregrine falcon	1	-	Adult	-	
20/06/2019	Red kite	1	-	Adult	-	
21/06/2019	Buzzard	1	-	-	-	
24/06/2019	Buzzard	1	-	-	-	
24/06/2019	Red kite	1	-	Adult	-	
25/06/2019	Barn owl	1	-	Adult	BO_1	
08/07/2019	Buzzard	1	-	-	-	
08/07/2019	Red kite	1	-	Adult	-	
08/07/2019	Red kite	1	-	Adult	-	
10/07/2019	Buzzard	-	-	-	-	
10/07/2019	Goshawk	1	-	Adult	-	
16/07/2019	Buzzard	-	-	-	-	
07/08/2019	Buzzard	-	-	-	-	
07/08/2019	Sparrowhawk	-	-	-	-	Minimum count
08/08/2019	Buzzard	-	-	-	-	
08/08/2019	Sparrowhawk	-	-	-	-	Lady Craig

D.6 Black Grouse Records

Table D-6 details all black grouse records with lek numbers indicated where appropriate. Refer to **Annex B** for survey methodology and **Annex C** for weather data.

Table D-6 Black grouse activity records: 2018 and 2019

Lek number	Date	Survey visit	No. males	No. females	No. unsexed	Notes
-	19/06/2018	SBBS 4	-	1	-	Female flew across and landed out of sight.
1	05/06/2019	VP A	4	-	-	Lekking from 07:12 until 11:24.
-	20/06/2019	BBS 7	-	1	-	
-	07/08/2019	SBBS 12	-	1	-	
-	13/09/2019	VP C	-	1	-	

D.7 Bird Species Index

A total of 89 bird species or signs was recorded at, or adjacent, to the Site during the ornithological surveys. **Table D-7** comprises a list of all these species along with their conservation status.

Table D-7 All bird species recorded at Cloud Hill Wind Farm (March 2018 to March 2020)

Species	Conservation status	Species	Conservation status
Barn owl	Schedule 1, BoCC Green	Lesser redpoll	BoCC Red
Black grouse	BoCC Red	Linnet	BoCC Red
Blackbird	BoCC Green	Long-tailed tit	BoCC Green
Blackcap	BoCC Green	Magpie	BoCC Green
Black-headed gull	BoCC Amber	Meadow pipit	BoCC Amber
Blue tit	BoCC Green	Merlin	Annex 1, Schedule 1, BoCC Red
Brambling	Schedule 1, BoCC Green	Mistle thrush	BoCC Red
Bullfinch	BoCC Amber	Nuthatch	BoCC Green
Buzzard	BoCC Green	Osprey	Annex 1, Schedule 1, BoCC Amber
Carrion crow	BoCC Green	Oystercatcher	BoCC Amber
Chaffinch	BoCC Green	Peregrine falcon	Annex 1, Schedule 1, BoCC Green
Chiffchaff	BoCC Green	Pied flycatcher	BoCC Amber
Coal tit	BoCC Green	Pied wagtail	BoCC Green
Collared dove	BoCC Green	Pink-footed goose	BoCC Amber
Common crossbill	Schedule 1, BoCC Green	Raven	BoCC Green
Common gull	BoCC Amber	Red grouse	BoCC Green
Common redstart	BoCC Amber	Red kite	Annex 1, Schedule 1, BoCC Green
Common sandpiper	BoCC Amber	Redwing	Schedule 1, BoCC Amber
Common whitethroat	BoCC Amber	Reed bunting	BoCC Amber
Cuckoo	BoCC Red	Robin	BoCC Green
Curlew	BoCC Red	Rook	BoCC Amber
Dipper	BoCC Amber	Sand martin	BoCC Green
Dunnock	BoCC Amber	Siskin	BoCC Green
Fieldfare	Schedule 1, BoCC Red	Skylark	BoCC Red
Garden warbler	BoCC Green	Snipe	BoCC Amber
Goldcrest	BoCC Green	Snow bunting	Schedule 1, BoCC Amber
Golden plover	Annex 1, BoCC Green	Song thrush	BoCC Amber
Goldfinch	BoCC Green	Sparrowhawk	BoCC Amber
Goosander	BoCC Green	Spotted flycatcher	BoCC Red
Goshawk	Schedule 1, BoCC Green	Starling	BoCC Red
Great black-backed gull	BoCC Amber	Stonechat	BoCC Green
Great spotted woodpecker	BoCC Green	Swallow	BoCC Green
Great tit	BoCC Green	Swift	BoCC Red
Green woodpecker	BoCC Green	Tawny owl	BoCC Amber
Greenfinch	BoCC Red	Tree pipit	BoCC Red
Grey heron	BoCC Green	Treecreeper	BoCC Green
Grey wagtail	BoCC Amber	Twite	BoCC Red
Hen harrier	Annex 1, Schedule 1, BoCC Red	Wheatear	BoCC Amber
House martin	BoCC Red	Whinchat	BoCC Red
House sparrow	BoCC Red	Willow warbler	BoCC Amber
Jackdaw	BoCC Green	Wood warbler	BoCC Red
Jay	BoCC Green	Woodcock	BoCC Red
Kestrel	BoCC Amber	Woodpigeon	BoCC Green
Lapwing	BoCC Red	Wren	
Lesser black-backed gull	BoCC Amber		

ANNEX E. COLLISION RISK ASSESSMENTS

Delaunay Triangulation[1] from the proposed turbine locations was used to create a wind farm area[2] and from this the Collision Risk Analysis Area (CRAA) was created using a 500 metre (m) buffer (**Figure 8.1**). Using the larger 500 m area around the turbines accounts for possible inaccuracies in the recording of flightlines and ensures the assessment is precautionary.

The ultimate aim is to have 100 % coverage of the turbines and associated CRAA by the viewsheds, however in practice this is often unachievable as a result of the topography of the Site and limited to no access outwith the Site boundary. For the Proposed Development, although some small areas of the CRAA remain 'invisible' at 20 m above ground level (**Figure 8.1**), the habitat within these areas is of sufficient similarity such that the survey data collected and subsequently assessed are considered to be representative of the whole CRAA. In addition, there were no records made during any of the surveys which would suggest that this area was of any particular importance to target species. Furthermore, the flying time at risk height (secsHahr^{-1}) for each species is calculated as a single mean activity rate within the entirety of the CRAA.

Table E-1, **Table E-2** and **Table E-3** present the parameters which apply to each Collision Risk Model (CRM).

Table E-1 Wind farm parameters

Size of wind farm envelope	537.83	hectares (ha)
Number of turbines	11	turbines
Rotor diameter	150	metres (m)
Hub height	105	m
Max. rotor depth	1.44	m (at 15° pitch angle)
Max. chord	4.2	m
Pitch	15	degrees (°)
Rotation period	5.5	seconds (secs)
Turbine operation time	0.85	percent (%)
Risk height: highest	180	m
Risk height: lowest	30	m
Flight risk volume	806740932	m^3

Table E-2 CRM parameters per species

Species	Length (m)	Wingspan (m)	Assumed flight speed, v (ms^{-1})	Avoidance rate	Probability of collision	Bird transit time (secs)
Curlew	0.6	1	13	0.98	0.0626	0.1567
Golden plover	0.28	0.72	17.9	0.98	0.0441	0.0960
Osprey	0.58	1.7	11.4	0.98	0.0694	0.1770
Peregrine falcon	0.48	1.1	12.1	0.98	0.0607	0.1580
Pink-footed goose	0.675	1.525	17.3	0.998	0.0585	0.1221
Red kite	0.66	1.95	12	0.99	0.0715	0.1748

[1] Delaunay triangulation is a form of mathematical/computational geometry where a given set of points (in this case the turbine locations) are all joined to create discrete triangles. Further information is available here:
https://uk.mathworks.com/help/matlab/math/delaunay-triangulation.html

[2] This was adjusted where appropriate depending on the spatial location of the turbines in relation to other turbines.

Table E-3 Visible area within the CRAA per vantage point

VP	Area (ha)
1	401.94
2	416.68

Birds are assumed to be active during all the daylight hours and this is estimated by calculating the number of hours per day between sunrise and sunset (adjusting for correct latitude) for the survey seasons as defined in **Table E-4** below.

Table E-4 Season definitions per species/species group

Species	Breeding season			Non-breeding season		
	Start date	End date	Hours presumed present	Start date	End date	Hours presumed present
Geese and swans	15th May	31st August	1,790	1st September	14th May	2,705
Raptors	15th March	31st August	2,641	1st September	14th March	1,854
Waders	1st April	31st July	1,966	1st August	31st March	2,529

Outputs for the CRM for the following species are presented in the following order below:

- Curlew;
- Golden plover;
- Osprey;
- Peregrine falcon;
- Pink-footed goose; and
- Red kite.

E.1 Curlew

Breeding Season 2019

Table E-5 Curlew flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	0	12058.15	0
2	5.09	7500.31	0.00000007

Table E-6 Curlew mortality estimates

Mean activity in wind farm at rotor height	0.000039	hr^{-1}
Total Combined rotor swept volume	396098	m^3
Bird occupancy	0.0764	hrs/season
Bird occupancy of rotor swept volume	0.1350	bird-sec
No. of transits through rotors	0.8612	per season
Estimated collisions	0.0539	per season
Estimated collisions after correction for operation	0.0458	per season
Estimated collisions after avoidance factor	0.0009	per season
Equivalent to 1 bird every	1091.28	seasons

E.2 Golden Plover

Non-Breeding Season 2018/2019

Table E-7 Golden plover flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	6.35	19293.03	0.000000042
2	0	22917.62	0

Table E-8 Golden plover mortality estimates

Mean activity in wind farm at rotor height	0.000022	hr^{-1}
Total Combined rotor swept volume	333894	m^3
Bird occupancy	0.0568	hrs/season
Bird occupancy of rotor swept volume	0.0846	bird-sec
No. of transits through rotors	0.8821	per season
Estimated collisions	0.0389	per season
Estimated collisions after correction for operation	0.0331	per season
Estimated collisions after avoidance factor	0.0007	per season
Equivalent to 1 bird every	1511.12	seasons

Non-Breeding Season 2019/2020

Table E-9 Golden plover flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	54.15	16881.41	0.00000040
2	0	20834.20	0

Table E-10 Golden plover mortality estimates

Mean activity in wind farm at rotor height	0.00021	hr^{-1}
Total Combined rotor swept volume	333894	m^3
Bird occupancy	0.5424	hrs/season
Bird occupancy of rotor swept volume	0.8082	bird-sec
No. of transits through rotors	8.4222	per season

Mean activity in wind farm at rotor height	0.00021	hr^{-1}
Estimated collisions	0.3717	per season
Estimated collisions after correction for operation	0.3159	per season
Estimated collisions after avoidance factor	0.0063	per season
Equivalent to 1 bird every	158.27	seasons

E.3 Osprey

Breeding Season 2018

Table E-11 Osprey flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height ($secsHahr^{-1}$)
1	0	17283.34	0
2	10.04	13750.57	0.0000001

Table E-12 Osprey mortality estimates

Mean activity in wind farm at rotor height	0.000048	hr^{-1}
Total Combined rotor swept volume	392210	m^3
Bird occupancy	0.1277	hrs/season
Bird occupancy of rotor swept volume	0.2235	bird-sec
No. of transits through rotors	1.2628	per season
Estimated collisions	0.0877	per season
Estimated collisions after correction for operation	0.0745	per season
Estimated collisions after avoidance factor	0.0015	per season
Equivalent to 1 bird every	670.81	seasons

E.4 Peregrine Falcon

Breeding Season 2018

Table E-13 Peregrine falcon flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	12.48	17283.34	0.00000011
2	0	13750.57	0

Table E-14 Peregrine falcon mortality estimates

Mean activity in wind farm at rotor height	0.00006	hr^{-1}
Total Combined rotor swept volume	372771	m^3
Bird occupancy	0.1587	hrs/season
Bird occupancy of rotor swept volume	0.2641	bird-sec
No. of transits through rotors	1.6662	per season
Estimated collisions	0.1011	per season
Estimated collisions after correction for operation	0.0860	per season
Estimated collisions after avoidance factor	0.0017	per season
Equivalent to 1 bird every	581.61	seasons

Breeding Season 2019

Table E-15 Peregrine falcon flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	8.31	16479.47	0.0000001
2	0	16667.36	0

Table E-16 Peregrine falcon mortality estimates

Mean activity in wind farm at rotor height	0.000037	hr^{-1}
Total Combined rotor swept volume	372771	m^3
Bird occupancy	0.0989	hrs/season
Bird occupancy of rotor swept volume	0.1645	bird-sec
No. of transits through rotors	1.0382	per season
Estimated collisions	0.0630	per season
Estimated collisions after correction for operation	0.0536	per season
Estimated collisions after avoidance factor	0.0011	per season
Equivalent to 1 bird every	933.38	seasons

E.5 Pink-footed Goose

Non-Breeding Season 2018/2019

Table E-17 Pink-footed goose flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	22981.57	24116.29	0.00014
2	0	20417.52	0

Table E-18 Pink-footed goose mortality estimates

Mean activity in wind farm at rotor height	0.077	hr^{-1}
Total Combined rotor swept volume	410677	m^3
Bird occupancy	208.5686	hrs/season
Bird occupancy of rotor swept volume	382.2235	bird-sec
No. of transits through rotors	3129.8861	per season
Estimated collisions	183.1325	per season
Estimated collisions after correction for operation	155.6627	per season

Mean activity in wind farm at rotor height	0.077	hr^{-1}
Estimated collisions after avoidance factor	0.3113	per season
Equivalent to 1 bird every	3.21	seasons

E.6 Red Kite

Breeding Season 2018

Table E-19 Red kite flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	0	17283.34	0
2	4.85	13750.57	0.000000043

Table E-20 Red kite mortality estimates

Mean activity in wind farm at rotor height	0.000023	hr^{-1}
Total Combined rotor swept volume	407761	m^3
Bird occupancy	0.0617	hrs/season
Bird occupancy of rotor swept volume	0.1122	bird-sec
No. of transits through rotors	0.6420	per season
Estimated collisions	0.0459	per season
Estimated collisions after correction for operation	0.0390	per season
Estimated collisions after avoidance factor	0.0004	per season
Equivalent to 1 bird every	2561.60	seasons

Non-Breeding Season 2018/2019

Table E-21 Red kite flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	12.13	17283.34	0.0000001
2	0	15833.99	0

Table E-22 Red kite mortality estimates

Mean activity in wind farm at rotor height	0.000055	hr^{-1}
Total Combined rotor swept volume	407761	m^3
Bird occupancy	0.1014	hrs/season
Bird occupancy of rotor swept volume	0.1846	bird-sec
No. of transits through rotors	1.0558	per season
Estimated collisions	0.0755	per season
Estimated collisions after correction for operation	0.0642	per season
Estimated collisions after avoidance factor	0.0006	per season
Equivalent to 1 bird every	1557.75	seasons

Non-Breeding Season 2019/2020

Table E-23 Red kite flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	10.78	14469.78	0.00000011
2	28.41	13750.57	0.00000028

Table E-24 Red kite mortality estimates

Mean activity in wind farm at rotor height	0.00021	hr^{-1}
Total Combined rotor swept volume	407761	m^3

Mean activity in wind farm at rotor height	0.00021	hr^{-1}
Bird occupancy	0.3846	hrs/season
Bird occupancy of rotor swept volume	0.6997	bird-sec
No. of transits through rotors	4.0029	per season
Estimated collisions	0.2863	per season
Estimated collisions after correction for operation	0.2434	per season
Estimated collisions after avoidance factor	0.0024	per season
Equivalent to 1 bird every	410.86	seasons

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