HEATHLAND WIND FARM
TECHNICAL APPENDIX A9.1: BASELINE ORNITHOLOGY REPORT 2018-19

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TABLE OF CONTENTS

ABBREVIATIONS

BoCC: Birds of Conservation Concern

BOU: British Ornithologists' Union

BTO: British Trust for Ornithology

CBC: Common Birds Census

FAS: Flight Activity Surveys

MBBS: Moorland Breeding bird Survey

OS: Ordnance Survey

SBL: Scottish Biodiversity List

NS: NatureScot

SPA: Special Protection Area

SSSI: Site of Special Scientific Interest

VP: Vantage Point

1 INTRODUCTION

1.1 Background

Arcus Consultancy Services Ltd (Arcus) was commissioned by EDF Renewables to evaluate the ornithological interest of the consented Heathland Wind Farm (hereafter referred to as 'the Site'). The Site is located approximately 1.5 km north-east of Forth in South Lanarkshire; the central grid reference of the Site is NGR 296516, 656987. The Site Boundary is shown in Figure 9.1.1, Appendix 1.

Baseline ornithological surveys were undertaken between 2012 and 2014 for a previous planning application submitted in 2016 on the same Site. Although the scheme was consented in 2018, a further year of ornithological surveys was completed in 2018 and 2019 due to proposed changes to the turbine footprint. Full details of previous ornithological surveys are available in the 2016 Environmental Statement[1]

The additional year of Baseline Ornithology Surveys of the Site and surrounding area commenced in September 2018 and were completed in August 2019. This report details the survey methods and results of all ornithological surveys undertaken during this period. A Confidential Annex (CA) has also been produced, detailing confidential results associated with ornithology surveys.

Species names used in this report follow the British List[2], which is maintained by the British Ornithologists' Union (BOU), with all species referred to by their British (English) vernacular name. A list of scientific names, as well as details of relevant legislation and conservation status, of all bird species referred to in this report is provided in Table A2.1, Appendix 2.

1.2 Site Description

The Site is largely comprised of coniferous plantation forestry, which is connected to larger extents of forestry to the north and west. There are some areas of clearfell, scrub and open ground within the Site, while adjacent to the Site is farmland and open moorland. In addition, the Site encompasses a number of watercourses.

1.3 Statutory Sites Designated for Ornithological Features

Two statutory designated sites of international ornithological importance have been identified within 20 km of the Site. Details are summarised in Table 1 below.

Table 1: Summary of statutory sites designated for ornithological interest within 20 km of the Site, listed in order of proximity

Site name	Designation(s)	Designated features	Description	Approximate distance to the Site*
Westwater	Special Protection Area (SPA), Ramsar site and Site of Special Scientific Interest (SSSI)	Pink-footed goose, non-breeding; and Waterfowl assemblage, non-breeding	Located 32 0m asl in the Pentland Hills. The site is an artificial reservoir and supports large numbers of wintering pink-footed geese and over 20,000 wintering waterfowl[3].	13.0 km to south-east

[1] Partnerships for Renewables. (2016). *Heathland Wind Farm Environmental Statement*. Planning application reference CL/16/0049. Available on the South Lanarkshire Council planning application search page: https://publicaccess.southlanarkshire.gov.uk/online-applications/

[2] British Ornithologists' Union. (2017). The British List: A Checklist of Birds of Britain (9th edition). *Ibis* 160: 190-240.

[3] NS. (2018). Citation For Special Protection Area (SPA) Westwater (UK9004251). Available online at: https://sitelink.nature.scot/site/8591

Site name	Designation(s)	Designated features	Description	Approximate distance to the Site*
Slamannan Plateau	SPA	Taiga bean goose, non-breeding	Located just east of Cumbernauld, in the headwaters of the River Avon. Consists of two small lochs and their surrounding peatlands and associated areas of rough and improved grassland. These habitats support roosting and feeding taiga bean geese during periods in winter[4].	19.5 km to north-west
*From closest point				

1.4 Consultation with NatureScot

A series of consultation documents were sent by Arcus to NatureScot[5] (NS) during ornithological surveys, in part to discuss ornithological sensitivities at the Site and the proposed survey scope. Consultation reports sent were as follows:

- Ornithology Consultation Report – October 2018[6];
- Ornithology Consultation Report – January 2019[7]; and
- Ornithology Consultation Report – March 2019[8].

Key information taken from relevant comments by NS relating to ornithological surveys is detailed in Table 2 below. Full comments are available within each consultation report.

Table 2: NS comments in response to ornithological consultation

Topic	Arcus Comments (and date)	NS comments (and date)
Long-eared Owl	Arcus would appreciate confirmation from NS regarding whether it is necessary to undertake targeted surveys for long-eared owl in 2019, or if surveys can be completed prior to construction (25/01/19).	Requested that targeted long-eared owl surveys are included within the survey scope, owing to the historical records of this species on Site (01/03/2019).
Crossbill	Although Crossbill Surveys were undertaken during the baseline surveys in 2013 and the species was recorded within the Site during those surveys, NS guidance[9] has since been updated and states that, if required, crossbill surveys should be undertaken prior to construction after consent for the proposed wind farm. Therefore, it is proposed that these	Confirmed that targeted survey for crossbill was not required, and that pre-construction surveys for this species would be sufficient (01/03/2019).

[4] NS. (2008). *Citation for Special Protection Area (SPA) Slamannan Plateau Falkirk and North Lanarkshire (UK9004441).* Available online at: https://sitelink.nature.scot/site/9184

[5] Note that Scottish Natural Heritage changed their name to NatureScot on 24/08/2020, and throughout this document are referred to by this name rather than SNH, which was current at the time consultation with this agency (detailed in Table 2) took place.

[6] Arcus (2018) Heathland Wind Farm Ornithology Consultation Report

[7] Arcus (2019a) Heathland Wind Farm Ornithology Consultation Report

[8] Arcus (2019b) Heathland Wind Farm Ornithology Consultation Report

Topic	Arcus Comments (and date)	NS comments (and date)
	surveys would not be necessary in 2019 (25/01/19).	
Goose Surveys	From reviewing the data, the majority of the high numbers of pink-footed geese recorded were associated with geese using Cobbinshaw Reservoir as a roost (up to 1,200 individuals) from December 2018 to February 2019. While it could not be ruled out that the geese using the roost at Cobbinshaw also roost at Westwater, there was no evidence to suggest that this was the case. Geese from Cobbinshaw Reservoir did not tend to fly towards the Site, appearing to favour foraging areas over 1 km to the south of the reservoir and Site Boundary. Flights recorded over the Site during winter 2018/19 were mainly of small groups of geese (1-100 individuals). Most of the flights were in a south to north (or north to south) direction rather than an east to west (or west to east) direction as would be expected for flights heading from/to Westwater SPA. Although single taiga bean geese were occasionally recorded during surveys, there was nothing found to suggest any connectivity with Slammanan Plateau SPA (23/04/19).	Confirmed that they were content that connectivity to Westwater SPA is unlikely, and that another season of winter surveys was not required based on the results to date (14/05/2019).

2 METHODS

Based on the habitats present within and around the Site, the results of the 2012-14 baseline ornithological surveys, consultation with NS and professional judgement, the 2018-19 baseline ornithology survey programme comprised the following:

- Flight Activity Surveys (FAS) (September 2018 to August 2019);
- Goose Surveys (September 2018 to May 2019);
- Black Grouse Survey (March to May 2019);
- Breeding Raptor Survey (March to August 2019);
- Long-eared Owl Surveys (March to July 2019); and
- Moorland Breeding Bird Survey (April to July 2019).

Full details of the methods followed for each of these surveys are provided below. Survey methods were based on current NS guidance[9], except where other methods are specified. Initially, Survey Areas were based upon a larger Site Boundary, buffers shown on Figure 9.1.1, Appendix 1 show distances from the current Site Boundary. The original Site Boundary covered an area of open moorland to the east, however it was subsequently decided that this land would not be developed.

2.1 Flight Activity Surveys

FAS were carried out between September 2018 and August 2019 (inclusive) using a series of watches from five Vantage Points[10] (VPs) overlooking the Site to record flight activity of target bird species. Target species included the following:

- All wild swan, goose and duck species;
- All raptors and owls listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[11] and/or Annex I of the Birds Directive[12];
- All wader species; and
- Black grouse.

The flight lines of all target species were recorded on large scale maps with the flight height of target species recorded at 15 second intervals. Based on the proposed turbine specifications, the following four height bands were used:

1. <20 m;
2. 20-150 m;
3. 150-200 m; and
4. >200 m.

In addition to recording target species flights, the number and activity of 'secondary' species was summarised every five minutes during each FAS. Secondary species included all other raptor species and raven.

Note that, due to access restrictions to the Site and delays in identifying suitable VP locations (see Section 2.7 for further detail), with the exception VP 1, the FAS were delayed until October (rather than commencing in September). Additional survey effort was therefore completed in October. Further details are provided in Section 2.7.

[9] Scottish Natural Heritage (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms,* (version 2, March 2017). SNH.

[10] VP locations were selected to cover an initial larger Site Boundary.

[11] http://www.legislation.gov.uk/ukpga/1981/69 [Accessed 13/02/2020]

[12] Directive 2009/147/EC on the conservation of wild birds: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:EN:PDF

2.1.1 Vantage Point Locations

Five VP locations[13] were identified to cover the area within the Site Boundary and an additional 500 m buffer. The VP locations and viewsheds are shown in Figure 9.1.2 Appendix 1.

2.1.2 Survey Effort

FAS were stratified to cover all times of day including dawn and dusk periods. For each season, the minimum recommended 36 hours was completed, with a minimum of 48 hours in the non-breeding season, and 42 hours per VP in the breeding season. Surveys were ideally undertaken for up to three hours, with a minimum 30-minute break in between watches. Due to weather conditions, surveys sometimes were reduced from three hours, with the outstanding survey effort completed through additional survey visits. Full details of survey dates, times and hourly weather conditions are presented in Table A3.1, Appendix 3.

Table 3: Breakdown of monthly FAS effort completed between September 2018 and August 2019

Month and year	Number of survey hours				
	VP 1	**VP 2**	**VP 3**	**VP 4**	**VP 5**
Non-breeding season					
September 2018	6	0	0	0	0
October 2018	12	11.5	12	15	12
November 2018	6	12.5	9	12	13.5
December 2018	12	12	15	12	10.5
January 2019	6	6	6	6	6
February 2019	6.66	6	6	6	6
Total non-breeding season hours	**48.66**	**48**	**48**	**51**	**48**
Breeding Season					
March 2019	6	6	6	6	6
April 2019	9	9	9	9	9
May 2019	9	9	9	9	9
June 2019	6	6	6	6	6
July 2019	6	6	6	6	6
August 2019	6	6	6	6	6
Total breeding season hours	**42**	**42**	**42**	**42**	**42**

2.2 Goose Surveys

Due to the presence of Westwater SPA 13.5 km to the south-east of the Site, Goose Surveys were completed during the non-breeding season, to determine whether any pink-footed geese were making regular use of the Site or surrounding area for foraging or roosting. Although Slamannan Plateau SPA is also located within 20 km of the Site, based on previous

[13] VP 1 covered an area of open moorland to the east of the current Site Boundary which had previously been considered for development.

results, it was considered unlikely that taiga bean goose would be making regular use of the Site or surrounding area. However, all goose species observed were recorded, together with other notable species.

2.2.1 Foraging Goose Surveys

In line with NS guidance[9], checks for foraging geese were completed twice per month between October 2018 and May 2019 (inclusive). Methods included checking suitable habitat for feeding geese within 500 m of the Site. Surveys used the 'look-see' method[14], with the observer driving or walking the Survey Area and stopping regularly to scan visually for birds using binoculars and/or a telescope.

Full details of survey dates, times and hourly weather conditions are presented in Table A3.2, Appendix 3.

2.2.2 Goose Roost Surveys

In addition to the field checks, two two-hour VP surveys per month were completed at Cobbinshaw Reservoir between September 2018 and May 2019 (inclusive) around the hours of dawn and dusk to identify whether it was used by roosting geese. The VP location (VP6) is shown on Figure 9.1.1, Appendix 1. In line with NS guidance[9], dawn surveys typically commenced one hour before sunrise, and dusk surveys typically ended one hour after sunset. However, based on the results obtained (which showed that flocks sometimes flew into roost more than one hour after sunset), it was decided that dusk survey times should be altered so that they ended approximately 1.5 hours after sunset.

Full details of survey dates, times and hourly weather conditions are presented in Table A3.3, Appendix 3.

2.3 Black Grouse Surveys

Black Grouse Surveys were completed between late March and late-April 2019, based on methods detailed in Gilbert *et al*. (1998)[15]. Surveys covered all potentially suitable lekking habitat within the Site Boundary and a surrounding 1.5 km buffer (access permitting). The Survey Area is shown in Figure 9.1.1, Appendix 1.

Suitable habitat was identified during the course of other ornithology surveys and through inspection of Ordnance Survey (OS) maps and aerial imagery of the Site. Subsequently, two visits to areas of suitable habitat were completed, with the aim of locating any black grouse leks.

Full details of survey dates, times and hourly weather conditions are presented in Table A3.4, Appendix 3.

2.4 Breeding Raptor Surveys

In line with NS guidance9, walkover surveys and additional VP watches of suitable areas of breeding habitat were undertaken between mid-March and early August 2019 to detect the presence of target raptors (including owls). Surveys followed methods detailed in Hardey *et al*. (2013)[16] and the Survey Area comprised suitable habitat in accessible areas within 1 km of the Site Boundary for barn owl and goshawk, and within 2 km for all other species.

[14] Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000). *Bird Census Techniques*, 2nd edition. Academic Press, London.

[15] Gilbert, G., Gibbons, D, W. and Evans, Evans, E. (2012) *Bird Monitoring Methods: A Manual of Techniques for Key UK Species*. Pelagic Publishing. ISBN 1-901930-03-3.

[16] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*, 3rd edition. SNH, Inverness

During the 2013-14 baseline surveys, goshawk was considered to be a key sensitivity due to high levels of flight activity. Therefore, a proportion of the breeding raptor surveys were targeted towards detecting goshawk territories and activity within suitable habitat in the Survey Area. Other target raptor species included those associated with the habitats present within the Site, such as hen harrier, short-eared owl, barn owl and merlin, as well as all other Annex I (EU Birds Directive) and Schedule 1 (Wildlife and Countryside Act 1981 as amended) raptors. Although the surveys focused on target species, secondary raptor species were also recorded, particularly where observations related to potential breeding territories. All observations were mapped using standard British Trust for Ornithology (BTO) species codes, and relevant descriptive notes were taken (e.g. whether birds were hunting, performing display flights etc.).

The Survey Area is shown in Figure 9.1.1, and full details of survey dates, times and hourly weather conditions are presented in Table A3.5, Appendix 3.

2.5 Long-eared Owl Surveys

Long-eared owls were confirmed to be breeding within the Site during the 2013 and 2014 baseline surveys. During 2019, surveys were undertaken within 1 km of the Site Boundary (access permitting), with methods following Hardey *et al.* (2013)[16]. This involved four visits to the Site between March and July 2019, between dusk and two hours after sunset, with surveyors used playback of calls at listening points to determine presence of any breeding pairs. Surveyors recorded vocalisations (including wing-clapping) and sightings which were used to determine whether any territories were present within the Study Area.

The Survey Area is shown in Figure 9.1.1, and full details of survey dates, times and hourly weather conditions are presented in Table A3.6, Appendix 3.

2.6 Moorland Breeding Bird Surveys

A Moorland Breeding Bird Survey (MBBS) was undertaken between April and July 2019 to map breeding wader territories. The Survey Area comprised areas of open moorland within 500 m of the Survey Area (access permitting). In line with guidance[9], the survey followed an adapted Brown and Shepherd (1993) method (designed to census upland breeding waders), with four survey visits completed (one per month). Wader registrations were recorded on large scale maps using standard BTO species codes, and Common Birds Census (CBC) symbology[17] to denote behaviour. Although the survey focussed on waders, other bird species (particularly species of conservation concern) were also recorded.

The Survey Area is shown in Figure 9.1.1, Appendix 1 and full details of survey dates, times and hourly weather conditions are presented in Table A3.7, Appendix 3.

2.6.1 Breeding Territory Analysis

Upon completion of all four MBBS visits, an analysis was completed to determine the number and approximate location of breeding territories of wader species. All registrations of waders recorded within moorland and open habitats on the field maps were transferred to produce 'species summary maps' from which the number and distribution of likely territories for each species could be determined. The method was based on that described by Bibby (2000)[18], with an element of professional judgement.

A precautionary approach was followed with a bird deemed to be holding a territory if breeding behaviour (e.g. singing, alarm-calling, adults carrying food) was observed, or if pairs of birds were observed in suitable habitat, during just one of the four Breeding Bird Survey visits.

[17] Marchant, J. (1983) *Common Birds Census Instructions*. British Trust for Ornithology, Thetford.

[18] Bibby, CJ, Burgess, ND, Hill, DA and Mustoe, SH (2000) Bird Census Techniques (2nd Edition)

2.7 Survey Limitations

The majority of surveys were carried out in optimal weather conditions, with good visibility during diurnal surveys. However, the extensive survey programme meant that it was not always possible to avoid sub-optimal weather, especially when conditions varied from forecast. This included periods of rain, mist and reduced visibility. Due to poor weather, some of the FAS were cut short. Additional visits were made to account for hours lost due to weather.

It is considered that undertaking surveys in a range of conditions is more likely to capture bird activity that is representative of the Site and surrounding area. As such, weather conditions are not considered to represent a significant limitation to the robustness of the baseline data obtained.

Due to access restrictions to the Site and delays in identifying suitable VP locations (with the exception VP 1) VP locations could not be finalised until October. This resulted in a delay to the commencement of FAS, which, with the exception of watches from VP 1, commenced in October rather than September. Additional effort was therefore completed in October to compensate for the lack of surveys in September.

Five VP locations[19] were identified to cover the area within the Site Boundary and an additional 500 m buffer. It is acknowledged that VPs 4 and 5 lie within the Site Boundary; however, options for alternative locations were exhaustively explored through a combination of viewshed analysis and multiple Site visits, and no suitable alternatives were identified. Following consultation with NS, this was confirmed to be suitable[20]. No other surveys were scheduled within viewsheds during FAS undertaken from VP 4 or VP 5.

With active forestry operations taking place widely across parts of the Site, it is expected that nesting birds in the area will already have developed a certain level of tolerance to background disturbance and forestry operations are not considered to have impacted upon survey results.

[19] VP 1 covered an area of open moorland to the east of the current Site Boundary which had previously been considered for development.

[20] Email response dated 21/12/2018

3 RESULTS

3.1 Flight Activity Surveys

3.1.1 Target Species Flights

A total of 349 flights by 22 identified target species and some unidentified geese were recorded during the FAS. Of these, pink-footed goose was recorded most frequently, with 109 flights (all during the non-breeding season). Fifty-five goshawk flights were recorded, as well as frequent curlew, snipe and golden plover flights (44, 26 and 20 flights respectively). All other species were recorded infrequently, with fewer than 20 registrations of each species. A summary of all target species flights, broken down by species and season, is provided in Table 4. Full details of each target species flight are presented in Table A4.1, Appendix 4 and flight lines are shown in Figures 9.1.3 to 9.1.7, Appendix 1.

Table 4: Summary of target species flights recorded during the 2018-19 FAS

Species*	Total no. of flights	No. of birds per flight	Total no. of individuals recorded	Schedule 1/ Annex I listings	Conservation listing(s)**	Corresponding figure no.
Canada goose	5	1-25	5			**9.1.3**
Greylag goose	15	1-30	95	Sch1.2	Amber	**9.1.**
Taiga bean goose	1	1	1			**9.1.**
Pink-footed goose	109	1-1000	6,488		Amber	**9.1.4**
Unidentified goose	5	1-29	61			**9.1.3 & 9.1.4*** **
Mute swan	3	1-3	6		Amber	**9.1.3**
Whooper swan	1	2	2	Sch1.1; Ann1	Amber; SBL	**9.1.**
Mallard	12	1-3	21		Amber	**9.1.6**
Goosander	1	1	1			**9.1.6**
Grey heron	5	1	5			**9.1.6**
Golden eagle	1	1	1	Sch1.1/1A/A1; Ann1	SBL	**9.1.7**
Goshawk	55	1-2	62	Sch1.1		**9.2.1**
Marsh harrier	5	1	5	Sch1.1; Ann1	Amber; SBL	**9.1.7**
Hen harrier	9	1	9	Sch1.1 & 1A; Ann1;	Red; SBL	**9.1.7**
Red kite	1	1	1	Sch1.1; Ann1	Amber; SBL	**9.1.7**
Oystercatcher	2	1-2	3		Amber	**9.1.6**
Lapwing	10	1-60	188		Red; SBL	**9.1.6**
Golden plover	20	1-130	580	Ann1	SBL	**9.1.6**

Species*	Total no. of flights	No. of birds per flight	Total no. of individuals recorded	Schedule 1/ Annex I listings	Conservation listing(s)**	Corresponding figure no.
Curlew	44	1-7	56		Red; SBL	**9.1.6**
Woodcock	8	1-2	10		Red; SBL	**9.1.6**
Snipe	26	1-4	43		Amber	**9.1.6**
Merlin	4	1	4	Sch1.1; Ann1	Red; SBL	**9.1.7**
Peregrine	7	1	7	Sch1.1; Ann1	SBL	**9.1.7**
Total no. of flights	**349**	**N/A**	**7,654**			

*Species names and order follow the British List maintained by the BOU[2].

** Sch1.1 = Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[11]

***As a precaution, unidentified goose has been included on both goose figures.

, Ann1 = Annex 1 of the Birds Directive[12], Red = UK Red-listed BoCC[21]; Amber = UK Amber-listed BoCC[21]; SBL = listed on the Scottish Biodiversity List[22]

3.1.2 Secondary Species Registrations

A number of secondary species were recorded during the FAS, with gull species (great black-backed gull, lesser black-backed gull, herring gull, common gull and black-headed gull), buzzard and raven recorded most frequently. There were also regular registrations of kestrel and sparrowhawk. Secondary species were generally recorded in low numbers, apart from gull species, with large flocks regularly recorded (peak count of 600 individuals).

3.2 Goose Surveys

Tables 5 and 6 summarise all pink-footed goose registrations recorded during the Goose Surveys. Note, however, that although other target species (particularly ducks) were frequently recorded during the surveys, since these are not the focal species, summaries of these species are limited to the most notable registrations and (for reasons of brevity) are not comprehensive.

3.2.1 Foraging Goose Surveys

During the Foraging Goose Surveys, no foraging geese were recorded within the Survey Area. One flock of foraging pink-footed geese was recorded approximately 2 km to the south of the Site, with at least 82 individuals present in the south. As this record was on the 10th April, it is possible that these birds were stopping over at the Site on their northward migration. A summary of the results is presented in Table 5.

[21] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746

[22] https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy/scottish-biodiversity-list [Accessed 14/02/20]

Table 5: Summary of September 2018 to May 2019 Foraging Goose Survey Results

Survey date	Pink-footed goose registrations	Other notable registrations
17/09/2018	• No foraging birds; • A flock of 57 birds flying south-east across Cobbinshaw Reservoir	• Two greylag goose flights (5 and 11 birds) to west of reservoir
15/10/2018	• None observed	• Female goshawk flying across Site; • Small numbers of waterfowl outside Survey Area (c.1 km to east) on reservoir, including 26 Canada geese
21/11/2018	• None observed	• No other target species observed
19/12/2018	• None observed	• 170+ greylag geese in field adjacent to eastern shore of reservoir; • Small number of waterfowl (including 11 Canada geese) also present on the reservoir
15/01/2019	• None observed within Survey Area; Several pink-footed goose flocks (totalling 1,281+ birds) present in fields to south of Survey Area (>1 km from Site Boundary)	• Small to moderate flocks of waterfowl on reservoir, including a flock of 60 wigeon
25/01/2019	• None observed within Survey Area; • a flock of 96 birds observed feeding in field to south-east of Survey Area (>1 km from Site Boundary); • A flock of 55 birds observed flying north-west over Site	• Small to moderate flocks of waterfowl on reservoir, including flocks of 80 wigeon and 66 teal
11/02/2019	• No foraging birds; • A flock of 60+ birds observed flying south-west over Site	• Small to moderate numbers of several wildfowl and wader species present at reservoir, including 121 greylag geese and 72 teal; • An adult female peregrine also observed at the reservoir
26/02/2019	• None observed within Survey Area; • a flock of 200 birds observed feeding in field approximately 2 km to south of Site	• Small to moderate numbers of several wildfowl and wader species present at Cobbinshaw Reservoir, including 62 greylag geese, 65 wigeon, 40 teal, 25 curlew and 20 oystercatcher
12/03/2019	• No foraging birds	• 56 foraging greylag geese foraging to east of reservoir; • One goshawk within the Site Boundary and one flock of 60+ golden plover recorded to the south west • Small to moderate numbers of several wildfowl and wader species present at reservoir, including 50 wigeon, 49 curlew and 28 oystercatcher
28/03/2019	• No foraging birds; • Two flights of 30 (over reservoir) and 100 birds (over Site from west to east)	• 49 greylag geese foraging in fields to south-west of reservoir; • Small to moderate numbers of waders and wildfowl present on reservoir and in adjacent fields, including 30 wigeon and 28 goldeneye

Survey date	Pink-footed goose registrations	Other notable registrations
10/04/2019	• Flock of 82+ birds foraging 2 km to the south of the Site • Flock of 200 individuals flying over southern section of Survey Area	• Small (<5 individuals) numbers of a variety of wildfowl and waders species present in Survey Area
30/04/2019	• No foraging birds	• 17 foraging greylag geese in fields to east of reservoir; • Small (<5 individuals) numbers of a variety of wildfowl and waders species present in Survey Area
06/05/2019	• No foraging birds	• Small (<5 individuals numbers of a variety of wildfowl and waders species present in Survey Area

3.2.2 Roosting Goose Surveys

During the Roosting Goose Surveys variable numbers of pink-footed geese were recorded roosting on Cobbinshaw Reservoir between December and February. The peak count of roosting birds recorded was approximately 1,200 birds at dawn on 25th January. Pink-footed geese flocks were also regularly recorded flying over the reservoir throughout the survey period, up to early April.

Other notable registrations included occasional records of 1-2 taiga bean geese: five flights of a single bird over the southern end of the reservoir on 29th October, two birds observed roosting on the reservoir at dawn on 10th April, and a flight of two birds the following evening. Greylag geese were regularly noted roosting on the reservoir, frequently associated with Canada geese, suggesting that this is a feral population. Groups of waders and wildfowl were also regularly recorded either on the reservoir or in adjacent fields. Results are summarised in Table 6.

Local residents provided anecdotal evidence that pink-footed geese roost on Cobbinshaw Reservoir throughout the winter. It was also noted by residents that thousands of pink-footed geese roosted on the reservoir historically (in the 1980s), but numbers decreased following dam repairs, which resulted in higher water levels; it was further suggested that a decrease in cereal crops may have contributed to the decline.

Table 6. Summary of September 2018 to May 2019 Roosting Goose Surveys

Survey date	Period	Pink-footed goose registrations	Other notable registrations
26/09/2018	Dusk	• No roosting birds; • One flight (20 birds) to south of Cobbinshaw Reservoir	• Other notable flights included a single short-eared owl and a flock of 15 golden plover, both to south of reservoir • Small numbers of waterfowl (including ducks) on reservoir
27/09/2019	Dusk	• No roosting birds present; • Three flights (totalling 213 birds) over reservoir in last hour of survey	• 68 roosting greylag geese; • 32 curlew present in fields; • Small groups of lapwing, oystercatcher and redshank present; • Small groups of ducks, including 20 goldeneye, present on reservoir
28/09/2018	Dawn	• No roosting birds;	• No other target species recorded

Survey date	Period	Pink-footed goose registrations	Other notable registrations
		• Two flights (1 and 50 birds) across southern end of reservoir	
23/10/2018	Dawn	• None observed	• A single oystercatcher flight and two Canada goose flights over southern end of reservoir • Small numbers of waterfowl (including ducks) on reservoir, and a flock of 12 wigeon feeding in adjacent field
29/10/2018	Dusk	• No roosting birds; • 13 flights (1-130 birds) across reservoir, particularly southern end	• Five flights of a single taiga bean goose across southern end of reservoir; • Other target species flights included flocks of 23 golden plover and 60 wigeon; • Small numbers of waterfowl (including 2 mute swans) on reservoir
21/11/2018	Dusk	• None observed	• Several Canada and greylag goose flights; • Several waterfowl species on reservoir, including roosting flocks of 27+ Canada geese and 65+ greylag geese
30/11/2018	Dawn	• No roosting birds; • Three flights (each of 1-2 birds) across southern end of reservoir	• Several flights of small greylag goose flocks (3-42 birds) across reservoir, particularly southern end
21/12/2018	Dawn	• Roosting birds may have been present at survey commencement, but it was not possible to confirm due to low light levels; • Two flights (500 and 450 birds) across southern edge of reservoir	• Several greylag goose flights; • 34 greylag geese feeding in field adjacent to eastern shore of reservoir; • Small to moderate flocks of waterfowl on reservoir, including flocks of 40 and 80 teal
23/12/2018	Dusk	• A flock of c.200 birds arrived to roost at southern end of reservoir; additional birds arrived after dark; therefore numbers could not be counted, but several hundred birds were thought to be present	• Small numbers of mute swan, Canada goose and greylag goose on reservoir, along with several duck species
07/01/2019	Dusk	• Several flocks, totalling c.1,000+ birds, flew in to roost on reservoir >1 hour after sunset (too dark to make accurate counts)	• Several waterfowl species on reservoir
08/01/2019	Dawn	• A flock of c.450+ birds observed leaving reservoir upon survey commencement, but birds had begun departing prior to this (i.e. >1 hour before sunrise); • A single bird subsequently flew onto reservoir and was shot by a wildfowler when leaving;	• Target species flights included small numbers of Canada and greylag geese; • Small to moderate flocks of waterfowl on reservoir, including a flock of 90 wigeon

Survey date	Period	Pink-footed goose registrations	Other notable registrations
		• Two further flights (totalling 300+ birds)	
24/01/2019	Dusk	• Four flocks (totalling c. 1,150 birds) observed flying in to roost at southern end of reservoir; difficult to count accurately due to level of activity; additional (smaller flocks) may have arrived undetected; • Six birds observed feeding (amongst greylag goose flock) in field adjacent to south-eastern shore of reservoir	• A flock of 120 greylag geese observed feeding in field adjacent to south-eastern shore of reservoir; • Small numbers of waterfowl on reservoir
25/01/2019	Dawn	• Approximately 1,200 roosting birds present on reservoir at survey commencement; all departed (flying south-west) 20-40 minutes before sunrise	• A flock of 150 greylag geese flew between fields adjacent to eastern shore of reservoir
12/02/2019	Dusk	• A minimum of 60 birds flew in to roost on reservoir from approximately 1 hour after sunrise; too dark to count flock sizes accurately	• Three greylag goose flocks (totalling 99+ birds) flew onto reservoir to roost; • Approximately 130 greylag geese in field adjacent to south-western shore of reservoir; • A flock of 59 wigeon and small numbers of a range of other waterfowl species on reservoir
15/02/2019	Dawn	• A minimum of 212 roosting birds on reservoir; • Several additional flocks passing over or flying into fields to feed (but none seen coming from roost)	• Several greylag goose flights; • Small numbers of a range of waterfowl species on reservoir
25/02/2019	Dusk	• A minimum of 71 birds flew in to roost on reservoir; additional birds heard later and were possibly roosting but too dark to confirm; • Four additional flights (1-40 birds) also recorded over reservoir	• A total of 101 greylag geese flew in to roost; • Other target species flights included flocks of 33 curlew and 60 wigeon; • Small to moderate numbers of a range of waterfowl and wader species on reservoir, including 35 curlew and 65 wigeon
26/02/2019	Dawn	• No roosting birds present; • Two flights (4 and 6 birds) across southern end of reservoir	• Three greylag geese present on reservoir at survey commencement; • Four greylag goose flights (3-30 birds) across southern end of reservoir
11/03/2019	Dusk	• No roosting birds present	• One flight of unidentified geese (likely Canada geese or greylag geese); • Flocks of curlew (50+ individuals), oystercatcher (30+ individuals) and goldeneye (44 individuals) recorded.

Survey date	Period	Pink-footed goose registrations	Other notable registrations
13/03/2019	Dawn	• No roosting birds present at commencement of survey; • Small groups (2 and 3 individuals) near reservoir which could have been roosting	• 72 greylag goose present on eastern shore of reservoir during survey; • Flocks of curlew and oystercatcher present; • Group of goldeneye on reservoir
28/03/2019	Dawn	• No roosting birds	• 12 roosting greylag geese
10/04/2019	Dawn	• One roosting bird present; • One flight of 300+ birds to south of Survey Area	• Two roosting taiga bean geese; • Flock of roosting greylag geese; • 19 goldeneye present, small groups of teal, shelduck, curlew and wigeon
11/04/2019	Dusk	• No roosting birds; • 1+ birds flying to roost in distance (heard only)	• Two taiga bean geese in flight; • 25 roosting greylag geese; • 10 golden plover recorded in fields
29/04/2019	Dusk	• No roosting birds	• Two roosting greylag geese; • Displaying lapwing, redshank, common sandpiper, snipe and curlew to south of reservoir
30/04/2019	Dawn	• No roosting birds	• Single roosting greylag goose; • Displaying redshank, lapwing, curlew and common sandpiper south of causeway
06/05/2019	Dawn	• Three birds roosting to the south of the causeway	• Four roosting greylag geese; • Small numbers of shelduck, teal, oystercatcher, curlew and goldeneye
07/05/2019	Dusk	• One roosting bird	• Two unidentified geese (likely taiga been goose) roosting; • 13 roosting greylag geese; • Small numbers of lapwing, snipe, redshank, oystercatcher, curlew and goldeneye

3.3 Black Grouse Survey

Suitable habitat for lekking black grouse was present within 1.5 km of the Site Boundary, including areas of immature coniferous forestry and clearings, moorland and open rough grazing.

During targeted surveys to record lekking males, no black grouse were recorded. There were no registrations of this species during other surveys.

3.4 Breeding Raptor Surveys

3.4.1 Target Raptor Species

Goshawk was the only target species recorded during targeted raptor surveys. Individuals were recorded during March and April, including display flights in both months. This indicates that at least one, possibly two territories were being established within the Survey Area, however no nest sites were found during searches, and historically occupied nest sites were inactive.

Although no nests were recorded, it is possible that breeding attempts could have taken place early in the breeding season and failed before they could be detected by surveyors.

Further information regarding goshawk, including a figure, is included in the Confidential Annex.

Incidental records of target raptor species included an immature peregrine hunting south of Pateshill Wind Farm during an MBBS visit on 25th April 2019. Additionally, Arcus surveyors met two surveyors in July 2019 who reported anecdotally seeing a merlin pair during April and May 2019, and a female hen harrier during winter 2018/19, both present in the wider area.

3.4.2 Secondary Species

Three secondary species were observed during the surveys: buzzard, sparrowhawk and kestrel. Registrations of each species are briefly summarised below.

- **Buzzard**: frequently recorded, and several pairs were confirmed to be breeding within the Survey Area.
- **Sparrowhawk**: there were occasional registrations and the species was probably breeding within the Survey Area.
- **Kestrel**: there were regular registrations, and this species was probably breeding within the Survey Area.

3.5 Long-eared Owl Surveys

3.5.1 Targeted Surveys

During targeted surveys, one male long-eared owl was recorded singing in May to the south-west of the Site Boundary, while potential wing-clapping was recorded during a survey in April to the south-west. This indicates one potential territory. There is evidence that long-eared owls tend not to respond to calls if tawny owls are present[15]. A number of calling tawny owls were recorded incidentally during surveys. As long-eared owl is a highly cryptic species, it is possible that a small number of additional pairs were breeding undetected in the Site. Records of long-eared owl are shown in Figure 9.1.8, Appendix A.

3.5.2 Incidental Records

There was one incidental record of long-eared owl during ecological walkover surveys undertaken in July 2019, with an adult bird flushed from scrub to the north-west of the Site Boundary.

3.6 Moorland Breeding Bird Surveys

3.6.1 Breeding Waders

Of the total 67 species recorded within 500 m of the Site, four were breeding waders: lapwing, curlew and snipe. Numbers of territories of each of these species are provided in Table 9 and locations are shown in Figure 9.1.9, Appendix 1. In addition, oystercatcher, golden plover and common sandpiper were recorded, however no evidence of breeding was observed within 500 m of the Site Boundary.

Table 9: Summary of wader species of conservation concern assessed as breeding during the 2019 MBBS

Species*	Number of territories in MBBS Area			Relevant legislation/ conservation listings**
	Within Site Boundary	In 500m buffer	Total	
Lapwing	0	1	**1**	Red; SBL
Curlew	0	2	**2**	Red; SBL
Snipe	0	1	**1**	Amber
*Species names and order follow the British List maintained by the BOU[2]. **Red = UK Red-listed BoCC[21]; Amber = UK Amber-listed BoCC[21]; SBL = listed on the Scottish Biodiversity List[22]				

3.6.2 Other Species

The other species recorded during surveys were sparrowhawk, buzzard, great black-backed gull, herring gull, lesser black-backed gull, feral pigeon, woodpigeon, swift, great spotted woodpecker, kestrel, peregrine, jackdaw, carrion crow, raven, coal tit, blue tit, great tit, skylark, swallow, house martin, willow warbler, sedge warbler, grasshopper warbler, whitethroat, goldcrest, wren, starling, blackbird, song thrush, mistle thrush, spotted flycatcher, robin, stonechat, wheatear, house sparrow, pied wagtail, meadow pipit, tree pipit, greenfinch, linnet, probable common redpoll, lesser redpoll, crossbill, goldfinch, siskin and reed bunting. Many of these species are likely to be breeding within the Site.

Two Schedule 1 species, peregrine and crossbill were recorded. An immature peregrine was observed hunting, and was not breeding within the Survey Area. Crossbill was recorded calling, although no confirmed breeding activity was noted. However, as this was not a focal species and little of the woodland was covered during surveys, it is likely that this species is breeding within the Site.

As the above were not focal species, they have not been mapped. A full list of all species recorded during ornithology surveys are listed in Appendix 2, Table A.2.1.

4 SUMMARY OF KEY FINDINGS

4.1 Flight Activity by Target Species

A total of 349 flights by 22 identified target species were recorded during the FAS (Figures 9.1.6 and 9.1.7, Appendix 1), with pink-footed goose the most frequently recorded species (109 flights and 6,488 individuals), followed by goshawk (55 flights), and curlew, snipe and golden plover (20 or more flights by each species).

4.2 Goose Surveys

Pink-footed geese were regularly recorded roosting on Cobbinshaw Reservoir between December and February, with a peak count of 1,200 birds recorded. Small numbers of feral greylag geese were frequently roosting, while 1-2 taiga bean geese were occasionally recorded.

During field checks, no foraging pink-footed geese were recorded within the Survey Area, however one flock with at least 82 individuals was present to the south, approximately 2 km from the Site.

4.3 Black Grouse Survey

There were no records of black grouse during targeted surveys for this species, or during any other surveys.

4.4 Breeding Raptor Surveys

Goshawk was the only target raptor species recorded during targeted Breeding Raptor Surveys. Observations indicated that two probable breeding territories were present within the Survey Area. However, it is believed that breeding was either abandoned or failed early in the season following discussions with surveyors, and no active goshawk nests were found during searches of suitable habitat. Sparrowhawk, buzzard and kestrel were all confirmed or highly probable breeders within the Survey Area.

4.5 Long-eared Owl Surveys

There was one confirmed record of long-eared owl during targeted surveys for this species and a second potential record, while an adult bird was also recorded incidentally during other surveys. No breeding territories were identified, however due to the cryptic nature of this species it is possible that small numbers of breeding pairs were present within the Survey Area.

4.6 Moorland Breeding Bird Surveys

The breeding wader species assemblage within the Site and surrounding 500 m Buffer Area was typical of the Site location and habitats present. Breeding waders were recorded at low density with two curlew territories and single territories of both golden plover and snipe. The Survey Area also supports a range of non-target breeding species typical of the habitats present.