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Technical Appendix 8.1

Clune Wind Farm

Ornithology

RES Group

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1 Introduction

1.1 Terms of Reference

In September 2020, Atmos Consulting Ltd. was commissioned by Clune and Corrybrough Estate, and then latterly RES Group, to undertake ornithological surveys in relation to a proposed wind farm development on land south of the village of Tomatin, Highland.

The proposed Clune Wind Farm (hereafter referred to as the "Site") has been subject to avian surveys from September 2020 through to August 2022, sufficient to provide an initial impact assessment on avian receptors at the Site. Following subsequent design iterations, additional surveys were carried out on an area not previously surveyed between January 2023 through to December 2023.

This Technical Appendix provides details of the ornithology surveys carried out, reports on their findings and describes the results of the desk study carried out in support of the Ornithological Impact Assessment as described in Chapter 8: Ornithology of the EIA Report.

1.2 Site Location and Description

The Site (Figure 8.1.1, Appendix A) is located approximately 20km south-east of Inverness, and approximately 3km south-west of the village of Tomatin. The Site is predominately managed upland grouse moorland with agricultural fields and mixed woodland in lower altitude areas. Clune Burn and Allt Lathach traverse the Site along with other smaller tributaries running into the River Findhorn that lies to the north-west, outwith the Site boundary.

The land to the south is bounded by Carn Coire na Caorach (636m) and Carn Dubh (c. 450m) along its southern edge, and Càrn Phris Mhòir (618m) and Carn an Ailean (547m) along its northern edge. The Allt an t-Sionnaich and Caothan na Cuileige flow to the east and merge to form the Allt Coire Chaillich. This in turn merges with the Allt Coire Phris Mhòir to form the An Leth-allt which flows east, merging with smaller tributaries to form the Allt an Aonaich, which eventually discharges into the River Dulnain.

1.3 Objectives

The objectives of this Technical Appendix are to:

- summarise the avian desk study information obtained to date for the Site;
- document the ornithological survey methodologies and avian species recorded during the period of survey:
  - vantage point (VP) surveys undertaken between September 2020 and August 2022, with further surveys conducted from January 2023 to December 2023. All surveys included flight data recorded for target species;
  - moorland breeding bird surveys undertaken between April and July 2021, 2022, and 2023;
  - breeding raptor surveys undertaken between April and July 2021, 2022, and 2023; and

- black grouse *Lyrurus tetrix* surveys undertaken in April and May 2021, 2022, and 2023.

2 Ornithological Legislation & Conservation Status

Legislation, non-statutory conservation designations, and NatureScot (NS) guidance pertaining to the ornithological interests discussed within this report are presented below.

2.1 Wildlife and Countryside Act 1981 (as amended) & Conservation (Natural Habitats & c.) Regulations 1994 (as amended in Scotland)

The Wildlife and Countryside Act 1981 (as amended) (WCA) is the principal mechanism for the legislative protection of wildlife in Great Britain. All wild birds and their active nests, eggs, and young are protected from damage, destruction, or capture under the WCA. Bird species listed in Schedule 1 ('Schedule 1') gain additional protection particularly around their nests, with disturbance listed as an offence, with special penalties for breaches of the law related to those Schedule 1 species. The WCA also provides the mechanism by which the Conservation of Wild Birds (Directive 2009/147/EC, the 'Birds Directive'), particularly the species listed in Annex 1 of the Birds Directive ('Annex 1') is transposed into UK law, allowing for the designation of Special Protection Areas (SPAs).

The Birds Directive lays out special measures to conserve wild birds, their eggs, nests, and habitats, and applies special protection to those species as listed under Annex I of the Directive. This is to apply special protection, in particular, to those species that are migratory and are considered to be of a shared heritage and conservation responsibility across all European Union member states.

The Conservation of Habitats and Species Regulations (1994) (as amended in Scotland), or 'Habitat Regulations', are the method by which the relevant European Directives are translated into Scottish law, with the most recent modification consisting of the Amendment (Scotland) 2012 revision. Specifically, the Habitat Regulations transpose the Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') and Natural Habitats and Wild Fauna and Flora (92/43/EEC, the 'Habitats Directive') into a Scottish context.

2.2 Nature Conservation (Scotland) Act 2004

The Scottish Biodiversity List (SBL) was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) 2004 Act (NCSA) for the conservation of biodiversity. This legislation required Scottish Ministers to publish lists of species of flora, fauna, and habitats considered to be of principal importance for the purposes of biodiversity.

Taken together, the WCA (1981) and NCSA (2004) ensure that all wild birds, their nests and eggs are protected by making it an offence to:

- Intentionally or recklessly kill, injure or take any wild bird
- Intentionally or recklessly take, damage or destroy the nest of any wild bird while it is in use or being built
- Intentionally or recklessly take or destroy the egg of any wild bird

- Intentionally or recklessly disturb any wild bird listed on Schedule 1 of the WCA while it is nest building or is at (or near) a nest with eggs or young, or disturb the dependent young of such a bird without a Schedule 1 licence provided by NatureScot.

2.3 Ramsar

Ramsar sites are designated under the Ramsar Convention on Wetlands (Ramsar 1971), which requires signatories to maintain the ecological character of their internationally important wetlands.

Within the Scottish context, most Ramsars are also SPAs or Natura sites, with the exception of specific sites where they are designated as wetland habitats only. Generally, they have been treated as being the equivalent to Natura sites within the planning framework, although the situation has been complicated by recent statements on the Scottish Government website, which state that Ramsar qualifying interests that coincide with the interests of Natura sites are given the same level of legal protection; where interests are not the same as Natura interests but instead match SSSI interests, they will receive protection under the SSSI regime. As such, although sites designated as Ramsar sites will be identified as such in the text, any consideration will address them as SPAs only.

2.4 Biodiversity Action Plans

The UK Biodiversity Action Plan (UK BAP) was the UK's response to the commitments of the Rio Convention on Biological Diversity. The plan outlines action for 26 species of birds of conservation importance/concern.

The Nature Conservation (Scotland) Act 2004 places a duty of care on public bodies to further the conservation of biodiversity in Scotland, the execution of which is implemented through Local Biodiversity Action Plans (LBAPs).

The 'UK Post-2010 Biodiversity Framework' succeeded the UK BAP and 'Conserving Biodiversity – the UK Approach'. The framework takes into account the 'Aichi targets' following a conference in Japan in 2010 and publication of the new EU Biodiversity Strategy (EUBS) in 2011. It also complements existing UK biodiversity strategies and targets by identifying activities required to achieve them. This framework places more weight on national responses such as the Scottish Biodiversity Strategy, than on a UK-wide response.

2.5 Birds of Conservation Concern 5

The leading government (Joint Nature Conservation Committee (JNCC)) and non-government conservation organisations in the UK jointly reviewed the population status of the 247 bird species that are regularly found within the United Kingdom using data from national monitoring schemes. This was most recently reviewed in 2021 to create the Birds of Conservation Concern 5 (Stanbury *et al.*, 2021), which was an update to the earlier 2015 BoCC report.

Based on seven quantitative criteria, each species has been placed on one of three lists:

- Red - species that are globally threatened, have had an historical population decline in the UK from 1800 -1995, a rapid (> or = 50%) decline in UK breeding

population over the past 25 years, or a rapid (> or = 50%) contraction of UK breeding range over the past 25 years;

- Amber - species that have had a historical population decline from 1800-1995 but are recovering (population size has more than doubled over the past 25 years), a moderate (25-49%) decline in UK breeding population over the past 25 years, a moderate (25-49%) contraction of UK breeding range over the past 25 years, a moderate (25-49%) decline in UK non-breeding population over the past 25 years, or species with unfavourable conservation status in Europe also known as Species of European Conservation Concern (SPEC); and
- Green - species that have no identified threat to their population status.

2.6 Ornithological Guidance

NatureScot, formerly Scottish Natural Heritage[1] has produced several guidance documents in relation to the assessment of impacts of wind farm developments on bird populations. The following guidance informed the survey work and any subsequent assessments:

- Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action (2000);
- Monitoring the Impact of Onshore Wind Farms on Birds (2009a);
- Assessing the Cumulative Impacts of Onshore Wind Energy Developments (2012a);
- Natural Heritage Zones Bird Population Estimates (2015) (published by the Scottish Windfarm Bird Steering Group (SWBSG)) (Wilson, 2015);
- Assessing Connectivity with Special Protection Areas (SPAs) (2016a);
- Environmental Statements and Annexes of Environmentally Sensitive Bird information (2016b);
- Avoidance Rates for the Onshore SNH Bird Wind Farm Collision Risk Model (2017a);
- Recommended bird survey methods to inform impact assessment of onshore wind farms (2017b); and
- Assessing the Significance of Impacts from Onshore Wind Farms on Birds at Sites Outwith Designated Areas (2018a).

[1] References will therefore still refer to 'SNH' as this was the publisher of guidance etc at the time of publication.

3 Methodology

3.1 Desktop Study

3.1.1 Designated Sites

The desktop study consisted of a search for statutory and non-statutory designated sites with avian qualifying features within 10km of the Site, increased to 20km for Special Protection Areas with qualifying interests for geese as a result of NatureScot guidance on connectivity (SNH, 2016a), as well as a data review for sources of information relating to bird populations on and within the vicinity of the Site.

3.1.2 Species Records

A search of publicly available records on the National Biodiversity Network (NBN) Atlas (https://nbnatlas.org) for the last 10 years was completed to review historical records with respect to target species of birds that have been reported in the vicinity of the Site.

Only records that are licensed for commercial use have been consulted.

Confidential data relating to the presence of Annex 1 / Schedule 1 listed species was also obtained from RSPB, and is presented in Technical Appendix 8.2: Confidential records.

3.1.3 Target Species

Target avian species were identified as those that are either afforded specific legislative protection (i.e. of high conservation interest) or represent qualifying interests in designated sites in the wider area. Reference was then made to guidance for the identification of potentially vulnerable species (SNH, 2017a; SNH, 2018a). The final list of target species was determined using these guidance documents along with the likelihood of each species being present at the Site and in the environs (based upon available habitat, experience of working in this region and geographical location).

Target species are considered to be those:

- identified as potentially at risk from impacts of onshore wind farms (SNH, 2018a);
- species listed in Annex 1 of the EC Wild Birds Directive (2009/147/EC); and
- non-passerines listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

3.2 Survey Methodologies

Survey methodologies were in accordance with SNH (2017b) guidance as well as survey methodologies described in Gilbert *et al*. (1998) and Hardey *et al*. (2013).

All surveys were carried out by experienced ornithological surveyors who hold NatureScot Schedule 1 bird licences.

3.2.1 Diurnal Vantage Point Surveys

Diurnal VP surveys were initiated in September 2020 and undertaken following the methods recommended by NatureScot guidance at the time of survey (SNH, 2017a).

Each VP survey was undertaken by a suitably experienced single observer in conditions of good visibility. Acceptable weather conditions included winds no stronger than Beaufort force six, and no persistent rain. The surveyor positioned themselves as inconspicuously as possible to minimise their effect on the birds' natural behaviour. The surveyor surveyed a 180° arc centred on a predetermined view bearing. While the VP was selected to ensure that the viewshed covered the required study area out to 2km, as per NatureScot guidance, observations from the VP have not been constrained to a 2km radius with any observations beyond 2km recorded as incidental records. The viewshed is based on visibility over bare ground at a perceived layer 20m above the ground. Appendix A, Figure 8.1.3 shows the VP locations and their viewsheds.

Table 1 presents the details of all VP locations.

Table 1: Details of Vantage Point Locations

VP Number	Grid Reference Easting	Northing	View Bearing	Notes
1	285265	825880	315°	Used between September 2020 and February 2021
2	282281	825774	15°	Used between September 2020 and February 2021
3	282800	827710	0°	Used between September 2020 and February 2021
4	285548	827478	10°	Used between September 2020 and February 2021
5	283837	825847	240°	Used continually between September 2020 and August 2022
6	280712	824851	80°	Used continually between September 2020 and August 2022
7	281807	823618	240°	Used continually between September 2020 and August 2022
8	278600	824033	140°	Used continually between September 2020 and August 2022
9	279586	820302	315°	Used continually between September 2020 and August 2022
9 Alternative	279180	822177	165°	Used as alternative to VP9 when snow blocks the access tracks
10	276374	821732	75°	Used continually between September 2020 and August 2022
11	276048	824421	180°	Used continually between September 2020 and August 2022
12	280206	819990	35°	Used continually between January 2023 and December 2023

VP Number	Grid Reference Easting	Northing	View Bearing	Notes
13	282911	821541	225°	Used continually between January 2023 and December 2023

VP locations 1 to 11 have been used between September 2020 and August 2022. Since February 2021 the project has focussed on the ground to the south-west of the A9 and as a result, only VPs 5 to 11 were required for the continuation of the surveys. From January 2023 layout changes meant that additional areas needed surveying which had not been previously surveyed; as such vantage points 12 and 13 were surveyed between January 2023 and December 2023.

Surveys at each VP location lasted no longer than three hours duration, and were undertaken, on average, twice per month in accordance with guidance (SNH, 2017b). No simultaneous observations were undertaken. Other survey work and estate activity on the Site was considered during planning the surveys to minimise the potential for disturbance of baseline conditions and issues compromising data integrity. Diurnal VPs were undertaken at varying times of the day during daylight hours (between dawn and dusk) in any given survey day.

During each survey, the landscape was scanned continuously until a target species was detected. Once detected, the bird was observed until it landed or flew out of sight, with monitoring occurring so long as it remained within the viewshed field of view. The time of first detection was noted, and the exact time spent flying in a specified height band was recorded.

Flight lines were recorded within the following three height bands:

- A - < 20m;
- B - 20m – 175m; and,
- C - > 175m.

Height band B is where collision risk can occur, being the height at which the turbine blades will sweep once the proposed development is active. Birds at this height are therefore considered to be at collision risk height. Details of the date, timing, and surveyor for all VP surveys are provided in Tables 30 and 31, Appendix B.

Subsequent to the surveys having been carried out, proposed turbines have a swept area of between 35m and 200m; as a result of this data was reclassified such that any flight segments that recorded an average height of between 20 – 220m were regarded as being at risk of collision. All flights outside these parameters were classified as not being at risk.

3.2.2 Brown and Shepherd Breeding Bird Survey

An upland breeding bird survey was carried out using the Brown & Shepherd upland breeding bird survey method for moorland habitats (Brown & Shepherd 1993) but using four visits as per NatureScot guidance (SNH, 2017a). This technique is used to census upland breeding waders such as golden plover *Pluvialis apricaria*, dunlin *Calidris alpina*, greenshank *Tringa nebularia,* and other species of open upland moor but can be used to record all moorland species and provides a reliable estimate for most other species so long as four visits are used.

These were completed between April and August of 2021 and 2022, avoiding high winds and other unfavourable weather conditions. The method is based on a constant search effort, allowing 20 to 25 minutes per 500 x 500m quadrat of open land. A predetermined route through each quadrat was followed so that all areas of each quadrat were approached within at least 100m, with the surveys taking place between 08:30 and 18:00, in accordance with guidance.

Following the identification of the additional area, further breeding bird surveys were conducted across that area. These were conducted using the same methodology over a period of April 2023 to August 2023. These surveys were conducted on tablets rather than paper maps, utilising the GIS Fieldmaps application.

The behaviour and location of each individual bird were recorded on a 1:25,000 scale map, using standard BTO codes. Records from each survey were combined into a final visit map, so that duplicate records of the same birds could be removed. Surveys done on tablet were later viewed within GIS for territory analysis upon a single map featuring all datapoints.

Birds were assumed to be breeding or holding a territory (confirmed breeding) at a location if one or more of the following was recorded:

- Presence of a nest, eggs, or young (including newly fledged); and/or
- A bird was observed carrying food or breeding material.

In the absence of either of these indicative behaviours, birds were classified as probable breeding if one or more of the following was recorded:

- Courtship, displaying or singing in the same location on more than one visit;
- Agitated behaviour including alarm calls or distraction display; and/or
- Territorial disputes.

In the absence of any of the above indicative behaviours, birds were classified as possible breeding if one or more of the following was recorded:

- Singing or displaying on one visit;
- A pair in suitable habitat; and/or
- Birds reacting antagonistically on one visit.

Other records were considered to be of non-breeding birds.

3.2.3 Breeding Raptor Survey

Surveys for breeding moorland raptors require visits between March and July. The first visit in March to early April is carried out to detect occupancy by the various species. A second visit is used to identify active nests in April and early May. The third visit is carried out in June to check for the presence of young birds, and the final visit in July to August is used to recorded fledged young (Hardey *et al.*, 2013). Surveys were carried out during daylight hours.

Target species during the breeding raptor surveys included golden eagle *Aquila chrysaetos*, hen harrier *Circus cyaneus* and merlin *Falco columbarius*. These were identified based on the suitable habitats present on the Site.

The identity and activity of all raptors were recorded on 1:25,000 scale maps, using standard BTO codes for all species and behaviour. Raptor surveys were enacted over the original area and then the additional area over the relevant years.

3.2.4 Black Grouse Survey

The black grouse lek survey followed the National Black Grouse Survey Instructions (Hancock et al., 1999) summarised in Gilbert et al. (1998), which involves a preparatory visit followed by one or more further visits between the last week in March and mid-May to locate leks and count any lekking birds. The survey area included the Site and a 1.5km buffer of the Site boundary (the recommended buffer distance in NatureScot guidance (SNH, 2017a)). Surveys to observe potential black grouse presence were enacted over the original and additional areas during their relevant years.

3.3 Survey Limitations

Persistent winter weather during January, February, April and May 2021 severely limited access to the hill tracks throughout the Site. Lower altitude VPs were relatively unaffected and were completed on schedule. Where access was possible, higher altitude VPs during January and February were completed in March 2021. This may have resulted in some bird activity (such as early raptor breeding behaviour as well as winter use of the Site by resident species) going unrecorded; however, all further VP surveys and breeding raptor surveys were completed on time, providing sufficient data for the Site.

Limited access to the Site during April and May 2021 as well as persistent wet and windy weather disrupted the undertaking of breeding bird and breeding raptor surveys during the spring of 2021 in what was a poor spring for breeding as a result of the cold, wet start to the year. It is possible some early territory behaviour went unrecorded during the start of the breeding season and abandoned territories may have been missed; however, to compensate for the delay and observe any late breeding attempts, the surveys continued until August 2021.

Poor weather conditions in April and May 2022 disrupted the undertaking of breeding raptor surveys at this time as priority was given to ensuring the completion of the first breeding bird survey visit. Given the lack of access beyond the Site boundary, it is considered that this is not a significant limitation.

During the red grouse *Lagopus lagopus scotica* breeding season, poor weather conditions restricted surveyors to the Site access tracks in order to avoid flushing red grouse and potentially expose red grouse eggs or young to the cold. This created challenges in timetabling and meeting certain survey requirements within a specified time frame. Access was also limited within the breeding bird and breeding raptor buffer zones, particularly along the west and north-west boundary. To provide sufficient survey cover, these areas were observed either from a vehicle when accessing the Site or with the use of binoculars and scoping equipment. No access was granted to survey within the 6km eagle buffer zone.

As no access was permitted within the 1.5km buffer zone, the black grouse surveys focussed on the Site.

During the 2023 to 2024 survey period adverse weather conditions impacted track quality and limited access to the VP12 survey area on several occasions (primarily in winter). This often resulted in surveys being delayed to ensure surveyor safety. To mitigate for this, surveys were enacted as soon as access was cleared to this area of the Site to catch up for any missed survey dates, primarily those in January. Similarly, the prior mentioned issues of access during the red grouse breeding season were present

over the 2023 to 2024 survey period, primarily impacting breeding bird and raptor surveying dates and scope.

4 Results

4.1 Desktop Study

4.1.1 Designated Sites

Special Protection Areas (SPAs)

Kinveachy Forest SPA is situated circa 650m south-east of the Site boundary at its closest point, and encompasses much of the last remnants of the Caledonian pine forest in Strathspey. It is of national and international importance for supporting a breeding population of two Annex 1 species, Scottish crossbill *Loxia scotica* and capercaillie *Tetrao urogallus*. Details of these designated species are listed in Table 2.

Table 2: Kinveachy Forest SPA qualifying features (SNH, 2000)

Species	Scientific Name	Criteria for inclusion	Population Estimates (2000)
Capercaillie	*Tetrao urogallus*	Article 4.1	200 individuals (13% of the British breeding population)
Scottish Crossbill	*Loxia scotica*	Article 4.1	30-70 individuals (3% of the British population)

Loch Vaa SPA is situated circa 8.9km to the south-east of the Site boundary at its closest point. It is a small, oligotrophic, spring-fed loch of about 500m diameter. The indented shoreline forms a series of species-rich, small bays and inlets and is vegetated with fen and bog communities. The loch is surrounded by birch *Betula* sp. woodland to the south and mostly mature Scots pine *Pinus sylvestris* plantation to the north.

It is of national and international importance for supporting a breeding population of the Annex 1 species Slavonian grebe *Podiceps auritus* (Table 3 refers).

Table 3: Loch Vaa SPA qualifying features (SNH, 2018c)

Species	Scientific Name	Criteria for inclusion	Population Estimates (2000)
Slavonian Grebe	*Podiceps auritus*	Article 4.1	Up to 7 pairs (10% of the GB population)

Sites of Special Scientific Interest (SSSI)

The boundary of **Kinveachy Forest SSSI** overlaps the south-eastern edge of the Site boundary, but the turbines are located as such to prevent any oversail of the SSSI. It comprises a large proportion of Stathspey's Caledonian pine forest. The Site supports a breeding bird assemblage including capercaillie, Scottish crossbill, crested tit *Lophophanes cristatus*, black grouse, siskin *Spinus spinus*, great spotted woodpecker *Dendrocopos major*, golden eagle, osprey *Pandion haliaetus* and merlin (SNH, 2010).

Loch Vaa SSSI is located approximately 8.9km to the south-east of the Site boundary at its closest point. It is important as a breeding site for two nationally rare bird species – Slavonian grebe and goldeneye *Bucephala clangula* (SNH, 2009b).

Important Bird Areas (IBA)

Kinveachy Forest IBA is located approximately 650m south-east of the Site boundary at its closest point, and shares the same boundary and qualifying features as the SPA of the same name.

4.1.2 Species Records

A search of the NBN Atlas for the last 10 years within a 5km radius of the Site showed records for species that are listed either on Annex I of the EC Birds Directive (2009/147/EC), Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), and / or are species determined by NatureScot to be particularly at risk from onshore wind farms (SNH, 2018a) (undertaken under licence CC0, OGL, CC-BY). Relevant bird species from the search results are listed in Table 4.

Table 4: Recorded Bird Species (NBN Atlas) [1]

Species	Annex 1	Schedule 1	At Risk from Wind farms
Curlew			X
Dunlin [2]	X		X
Golden eagle	X	X	X
Golden plover	X		X
Goshawk	X	X	
Greylag goose		X * (in Outer Hebrides, Caithness, Sutherland and Wester Ross only)	X
Hen harrier	X	X	X
Herring gull			X
Lapwing			X
Merlin	X	X	X
Pink-footed goose			X
Red kite	X	X	X
Scottish crossbill	X	X	X
Short-eared owl	X		X
Snow bunting		X	
Whimbrel		X	X
Whooper swan	X	X	X

[1] All data presented in Table 4 is sourced from Birds (BTO/JNCC/RSPB Partnership)

[2] Only *schinzii* race listed as an Annex I species

* Listed on Schedule 1, Part II of the WCA 1981. Birds are afforded special protection during the close season which is 1 February to 31 August (21 February to 31 August below high water mark) but which may be killed or taken outside this period.

Confidential data relating to the presence of Annex 1 / Schedule 1 listed species was also obtained from RSPB, and is presented in Technical Appendix 8.2: Confidential records.

4.2 Vantage Point Survey

While VP surveys were conducted over a wide area to accommodate all possible design iterations, reporting and assessment is based on those VP locations that overlook the final design turbine envelope (specifically VPs 8, 9, 10, 12 and 13).

Tables 5 and 6 summarise the VP survey effort across the aforementioned VP locations from September 2020 to August 2022, and January 2023 to December 2023 inclusive, respectively. The specific details of each VP survey visit (date, time, duration and surveyor) can be found in Appendix B, Tables 30 and 31. A summary of the weather conditions during all VP surveys is presented in Appendix C, Tables 32 and 33. Section 3.2.1 provides an explanation of the number of hours that were surveyed from each location.

Table 5: Vantage Point Survey Effort (September 2020 – August 2022)

Month	VP8	VP9	VP10	VP11
Sep-20		6	6	6
Oct-20	12	6	6	6
Nov-20	6	6	6	6
Dec-20	6	6	6	6
Jan-21				6
Feb-21				9
Mar-21	18	12	12	3
Total hours in non-breeding season 20/21*	**42**	**36**	**36**	**42**
Apr-21*	6	9	10.5	6
May-21		6	4.5	6
Jun-21	9	6	9	6
Jul-21	9	9	6	6
Aug-21**		6	6	6
Total hours in breeding season 2021	**24**	**36**	**36**	**30**
Sep-21	12	6	6	3
Oct-21	6	6	6	9
Nov-21	9	9	9	6
Dec-21	9	9	9	6
Jan-22	3	3	3	6
Feb-22	3			6
Total hours in non-breeding season 21/22	**42**	**33**	**33**	**36**
Mar-22***	6	5.5	3	6
Apr-22	6	9.5	12	6
May-22	6	3	3	3
Jun-22		6	6	9
Jul-22	6	3	3	3
Aug-22	12	9	9	9
Total hours in breeding season 2022	**36**	**36**	**36**	**36**

* Due to an extended period of winter weather in January and February 2021, access to the Site was restricted to lower altitude VPs only. Where access was possible, the January and February requirement was undertaken in March 2021 to achieve the requisite number of hours per VP for the season. Due to this, March will be included within the 2020/2021 non-breeding season and the 2021 breeding season will commence in April 2021.

** Two surveys were undertaken in September 2021 to complete August's 2021 survey requirement.

*** Three surveys were undertaken in March 2022 to complete February's 2022 survey requirement.

Table 6: Vantage Point Survey Effort (January 2023 – December 2023)

Month	VP12	VP13
Jan-23	0	12
Feb-23*	18	9
Total hours in non-breeding season 23	**18**	**21**
Mar-23	6	6
Apr-23	6	6
May-23	6	6
Jun-23	6	6
Jul-23	6	6
Aug-23	6	6
Total hours in breeding season 2023	**36**	**36**
Sep-23	6	6
Oct-23	6	6
Nov-23	6	6
Dec-23	6	6
Total hours in non-breeding season 23/24	**24**	**24**

* Six of the surveys that were undertaken in February 2023 from VP12 replaced surveys in January 2023 as wintry conditions in January prevented access. Surveys were undertaken at intervals throughout the month.

4.2.1 Vantage Point Survey Results

A total of 26 target species were recorded during VP surveys between September 2020 and August 2022, and then January 2023 to December 2023. A summary of target species flights and flight times are presented in Table 7.

Appendix D, Table 34 and Table 35 details individual flight data for all target species. A complete species list with conservation status details of all species is included in Appendix E, Table 36.

The flight lines for these registrations are presented in Appendix A, Figures 8.1.4a – 8.1.9, and include all ground registrations and heard-only registrations. Birds that were only heard, and not seen, are not included in the Table 7. A summary of all point registrations (i.e. ground registrations and heard-only registrations) is included in Appendix F, Table 37 and Table 38.

Table 7: Summary Flight Data for Target Species

Species	Scientific Name	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Canada goose	*Branta canadensis*	3	30	3	4,125	3,450
Curlew	*Numenius*	1	2	26	1,931	1,740

Species	Scientific Name	Minimum No. of Birds	Maximum No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
	arquata					
Golden eagle	*Aquila chrysaetos*	1	2	41	6,739	5,861
Golden plover	*Pluvialis apricaria*	1	3	17	322	209
Goshawk	*Accipiter gentilis*	1	1	1	140	140
Greenshank	*Tringa nebularia*	2	2	1	98	0
Greylag goose	*Anser anser*	1	255	31	169,508	58,756
Hen harrier	*Circus cyaneus*	1	2	8	639	494
Lapwing	*Charadrius dubius*	1	2	13	912	518
Peregrine	*Falco peregrinus*	1	1	4	362	355
Pink-footed goose	*Anser brachyrhynchus*	6	450	20	258,305	127,676
Red kite	*Milvus milvus*	1	5	139	16,838	14,183
White-tailed eagle	*Haliaeetus albicilla*	1	1	19	3,597	3,227

Red kite was the most commonly observed species and appeared most frequently within the risk height, across all VPs between September 2020 and August 2022, and January 2023 and December 2023. The upland moorland habitat as well as large, forested areas at lower altitudes surrounding the Site provide nesting and foraging habitat for red kites.

Both white-tailed and golden eagle were recorded on Site, often flying at risk height. Again, the habitat provides suitable foraging habitat which potentially falls within breeding territories centred offsite for both species resulting in their relatively frequent observation. Peregrine, hen harrier and goshawk were also recorded on Site, flying almost exclusively at risk height.

Flocks of Canada, pink-footed and greylag goose were recorded traversing the Site during the non-breeding season. All records came from the migration period and given the altitude observed, were likely to be from birds making longer distance movements, potentially migration or post moult dispersion[2]. Greylag goose activity involved a range of behaviour potentially including migrant, wintering and local residents (see Section 4.3).

[2] There is a feral Canada goose population which moults on the Moray Firth but resides in Yorkshire.

4.3 Moorland Breeding Bird Survey Results

4.3.1 2021

Four Brown and Shepherd visits were carried out as detailed in Table 8, which meets NatureScot guidance (SNH, 2017b) requirements of four survey visits at least seven days apart between early April and the end of July. The study area for this survey included the site boundary plus a 500m buffer (Appendix A, Figure 8.1.10 refers; Table 9 provides explanation of the BTO codes used).

Table 8: Moorland Breeding Bird Survey Effort 2021

Survey Compartment Number	Visit Number	Date	Observer	Start time	Stop time	Duration
1	1	21/06/2021	SL	09:10	14:30	05:20
	2	02/08/2021	SL	09:45	15:25	05:40
	3	18/08/2021	SL	09:20	14:30	05:10
	4	26/08/2021	IM	09:15	16:00	06:45
2	1	26/04/2021	SL	09:20	15:30	06:10
	2	07/06/2021	SL	09:30	15:10	05:40
	3	02/08/2021	SD	09:45	15:45	06:00
	4	19/08/2021	SL	09:30	14:30	05:00
3	1	22/06/2021	SL	09:20	15:45	06:25
	2	21/07/2021	DB	10:00	16:00	06:00
	3	03/08/2021	SL	09:20	15:30	06:10
	4	24/08/2021	IM	09:20	16:10	06:50
4	1	27/04/2021	SL	09:30	14:30	05:00
	2	13/05/2021	SL	09:05	14:15	05:10
	3	14/06/2021	KT	12:00	15:15	03:15
	4	28/06/2021	SL	09:30	15:45	06:15
	5	03/08/2021	SD	09:30	16:00	06:30
5	1	13/05/2021	DB	09:00	16:00	07:00
	2	04/08/2021	SL	08:30	14:25	05:55
	3	24/08/2021	SL	09:30	14:20	04:50
6	1	30/04/2021	SL	09:45	14:30	04:45
	2	14/05/2021	DB	09:00	16:00	07:00
	3	06/07/2021	KT	09:00	12:30	03:30
	4	16/07/2021	KT / KH	09:15	12:15	03:00
	5	22/07/2021	DB	09:30	15:30	06:00
	6	05/08/2021	SL	09:10	16:00	06:50
7	1	10/05/2021	SL	10:00	16:15	06:15
	2	14/07/2021	MC	10:00	16:15	06:15
	3	11/08/2021	SL	10:45	16:30	05:45
	4	20/08/2021	IM	09:15	15:00	05:45
8	1	10/05/2021	SL	10:00	16:15	06:15
	2	15/07/2021	MC	10:30	15:30	05:00
	3	12/08/2021	IM	09:30	15:45	06:15

Survey Compartment Number	Visit Number	Date	Observer	Start time	Stop time	Duration
	4	20/08/2021	KH	09:15	15:15	06:00
9	1	11/05/2021	IM	08:45	16:30	07:45
	2	08/06/2021	SL	09:00	14:00	05:00
	3	14/06/2021	KT	15:15	18:00	02:45
	4	23/06/2021	SL	09:35	12:00	02:25
	5	23/07/2021	DB	08:30	14:00	05:30
	6	17/08/2021	SL	11:25	15:30	04:05
	7	25/08/2021	IM	09:00	16:00	07:00
10	1	11/05/2021	SL	09:15	15:25	06:10
	2	15/07/2021	KT	09:45	15:30	05:45
	3	13/08/2021	IM	07:55	15:30	07:35
	4	26/08/2021	SL	09:15	15:00	05:45
11	1	12/05/2021	SL	09:15	11:30	02:15
	2	26/05/2021	SL	09:30	11:45	02:15
	3	30/06/2021	IM	08:30	17:00	08:30
	4	10/08/2021	IM	08:20	16:00	07:40
	5	23/08/2021	IM	09:30	16:00	06:30
12	1	12/05/2021	IM	08:30	10:45	02:15
	2	26/05/2021	SL	12:55	14:30	01:35
	3	02/07/2021	IM	08:45	16:30	07:45
	4	03/07/2021	IM	09:00	16:00	07:00
	5	23/08/2021	SL	09:00	15:30	06:30

During the breeding bird survey, a total of 36 species were recorded (Appendix A, Figure 8.1.10). Table 9 presents, alphabetically, each of the species in terms of their breeding status, conservation value, and whether they are considered to be at risk from wind farms (SNH, 2018). It also presents the species' breeding status at the Site.

Any raptors recorded during the breeding bird survey were used to supplement the breeding raptor surveys and are therefore not included in Table 9. Four commonly recorded species – meadow pipit *Anthus praetensis*, skylark *Alauda arvensis*, woodpigeon *Columba palustris* and carrion crow *Corvus corone* – that were regularly observed on Site are also excluded.

Table 9: Breeding Bird Survey Recorded Species 2021

BTO Code	Common Name	Scientific Name	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Priority Species	Birds of Conservation Concern (BoCC)	At risk from windfarms (NatureScot 2018a)	Breeding Status (possible, probable, confirmed or non-breeding)
BH	Black-headed gull	*Chroicocephalus ridibundus*			X	Amber		Non-breeding (3)

BTO Code	Common Name	Scientific Name	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Priority Species	Birds of Conservation Concern (BoCC)	At risk from windfarms (NatureScot 2018a)	Breeding Status (possible, probable, confirmed or non-breeding)
B.	Blackbird	*Turdus merula*				Green		Possible (1) Non-breeding (4)
BT	Blue tit	*Cyanistes caeruleus*				Green		Probable (1) Possible (4)
CH	Chaffinch	*Fringilla coelebs*				Green		Probable (2) Possible (6) Non-breeding (4)
CC	Chiffchaff	*Phylloscopus collybita*				Green		Probable (1) Possible (14) Non-breeding (1)
CT	Coal tit	*Periparus ater*				Green		Confirmed (1) Possible (5) Non-breeding (2)
CM	Common gull	*Larus canus*				Amber		Confirmed (1) Possible (2) Non-breeding (3)
CK	Cuckoo	*Cuculus canorus*			X	Red		Non-breeding (1)
CU	Curlew	*Numenius arquata*			X	Red	X	Possible (22) Non-breeding (9)
DN	Dunlin	*Calidris alpina*	X		X	Red	X	Possible (2)
D.	Dunnock	*Prunella modularis*				Amber		Non-breeding (1)
GO	Goldfinch	*Carduelis carduelis*				Green		Non-breeding (1)
GP	Golden plover	*Pluvialis apricaria*	X		X	Green	X	Probable (3) Possible (7) Non-breeding (17)
GT	Great tit	*Parus major*				Green		Possible (1) Non-breeding (3)
GL	Grey wagtail	*Motacilla cinerea*				Amber		Possible (1) Non-breeding (1)
GJ	Greylag goose	*Anser anser*				Amber	X	Confirmed (1)
L.	Lapwing	*Vanellus vanellus*				Red	X	Probable (1) Possible (6) Non-breeding (10)
MA	Mallard	*Anas platyrhynchos*				Amber		Confirmed (1) Possible (1)

BTO Code	Common Name	Scientific Name	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Priority Species	Birds of Conservation Concern (BoCC)	At risk from windfarms (NatureScot 2018a)	Breeding Status (possible, probable, confirmed or non-breeding)
M.	Mistle thrust	*Turdus viscivorus*				Red		Non-breeding (5)
OC	Oyster-catcher	*Haematopus ostralegus*				Amber		Probable (1) Possible (3) Non-breeding (2)
RN	Raven	*Corvus corax*				Green		Non-breeding (1)
RK	Redshank	*Tringa totanus*				Amber		Possible (1)
RO	Ring ouzel	*Turdus torquatus*			X	Red		Non-breeding (2)
R.	Robin	*Erithacus rubecula*				Green		Possible (2) Non-breeding (6)
RO	Rook	*Corvus frugilegus*				Amber		Non-breeding (2)
SM	Sand martin	*Riparia riparia*				Green		Probable (1) Non-breeding (1)
SN	Snipe	*Gallinago gallinago*				Amber		Probable (2) Possible (4) Non-breeding (16)
SC	Stonechat	*Saxicola rubicola*				Green		Confirmed (1) Probable (2) Possible (4) Non-breeding (10)
T.	Teal	*Anas crecca*				Amber		Possible (1)
TC	Tree creeper	*Certhia familiaris*				Green		Probable (1) Non-breeding (3)
TU	Tufted duck	*Aythya fuligula*				Green		Possible (1)
W.	Wheatear	*Oenanthe oenanthe*				Amber		Possible (2) Non-breeding (12)
WN	Wigeon	*Anas penelope*				Amber		Non-breeding (1)
WW	Willow warbler	*Phylloscopus trochilus*				Amber		Possible (4) Non-breeding (9)
WK	Woodcock	*Scolopax rusticola*			X	Red		Non-breeding (1)
WR	Wren	*Troglodytes troglodytes*				Amber		Probable (3) Possible (4) Non-breeding (8)

4.3.2 2022

Four Brown and Shepherd visits were carried out as detailed in Table 10, which meets NatureScot guidance (SNH, 2017b) requirements of four survey visits at least seven days apart between early April and the end of July. The study area for this survey included the site boundary plus a 500m buffer (Appendix A, Figure 8.1.11 refers).

Table 10: Moorland Breeding Bird Survey Effort 2022

Survey Compartment Number	Visit Number	Date	Observer	Start time	Stop time	Duration
1	1	15/04/2022	CM	09:30	16:30	07:00
	2	03/05/2022	FT	10:00	15:30	05:30
	3	12/07/2022	TJC	09:42	14:11	04:29
	4	03/08/2022	TJC	10:00	15:12	05:12
2	1	02/04/2022	SL	09:25	14:20	05:55
	2	18/05/2022	DMcK	10:00	16:00	06:00
	3	30/06/2022	CF	09:00	14:00	05:00
	4	20/07/2022	TJC	10:50	15:15	04:25
3	1	02/04/2022	CF	09:25	16:00	06:35
	2	31/05/2022	BW	12:00	17:30	05:30
	3	27/06/2022	BW	10:30	16:30	06:00
	4	12/07/2022	DMcK	10:15	16:15	06:00
	5	27/07/2022	BW	10:00	13:00	03:00
4	1	11/04/2022	SL / JE	11:20	16:30	05:10
	2	05/05/2022	CG	09:45	14:45	05:00
	3	07/07/2022	ADK	10:35	15:00	04:25
	4	20/07/2022	CF	12:00	15:00	03:00
5	1	21/04/2022	DMcK / SL	10:00	16:30	06:30
	2	04/05/2022	BW	10:15	16:45	06:30
	3	08/07/2022	ADK	10:05	14:00	03:55
	4	02/08/2022	ADK	10:30	16:30	06:00
6	1	14/04/2022	FT	09:25	14:50	05:25
	2	01/06/2022	JE	09:10	15:20	06:10
	3	27/06/2022	CF	10:30	16:00	05:30
	4	21/07/2022	JE	10:20	15:00	04:40
7	1	19/04/2022	BW	10:00	16:30	06:30
	2	02/06/2022	JE	09:00	15:10	06:10
	3	30/06/2022	ADK	10:00	15:00	05:00
	4	26/07/2022	BW	10:00	16:00	06:00
8	1	06/05/2022	JE	11:00	17:00	06:00
	2	05/06/2022	FT	10:00	15:10	05:10
	3	24/06/2022	BW	10:30	15:00	04:30
	4	03/08/2022	FT	10:00	15:00	05:00
9	1	18/04/2022	JE	10:30	16:30	06:00
	2	09/06/2022	JE / CB	09:00	15:00	06:00
	3	24/06/2022	JE	10:30	15:30	05:00

Survey Compartment Number	Visit Number	Date	Observer	Start time	Stop time	Duration
	4	21/07/2022	FT	10:00	15:30	05:30
10	1	21/04/2022	JE	09:40	16:00	06:20
	2	20/05/2022	CG	08:45	14:10	05:25
	3	05/07/2022	ADK	10:00	14:30	04:30
	4	03/08/2022	JE	10:10	14:50	04:40
11	1	06/04/2022	BW	09:30	16:15	06:45
	2	19/05/2022	CG	08:30	14:00	05:30
	3	22/06/2022	DMcK	11:00	16:30	05:30
	4	27/07/2022	CB	12:00	14:50	04:50
12	1	04/04/2022	BW	09:40	16:00	06:20
	2	12/05/2022	CF	09:30	15:30	06:00
	3	23/06/2022	DMcK / IM	09:25	15:30	06:05
	4	29/07/2022	CB	09:40	14:50	05:10

During the breeding bird survey, a total of 53 species were recorded (Appendix A, Figure 8.1.11 refers). Table 11 presents, alphabetically, each of the species in terms of their breeding status, conservation value, and whether they are considered to be at risk from wind farms (SNH, 2018). It also presents the species' breeding status at the Site.

Meadow pipit *Anthus praetensis* regularly occurred on the Site; due to their density across the site, territory analysis was not undertaken.

Table 11: Breeding Bird Survey Recorded Species 2022

BTO Code	Common Name	Scientific Name	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Priority Species	Birds of Conservation Concern (BoCC)	At risk from windfarms (NatureScot 2018a)	Breeding Status (possible, probable, confirmed or non-breeding)
BK	Black grouse	*Lyrurus tetrix*		X		Red	X	Possible (1)
B.	Blackbird	*Turdus merula*				Green		Possible (2) Non-breeding (3)
BH	Black-headed gull	*Chroicocephalus ridibundus*			X	Amber		Non-breeding (1)
BT	Blue tit	*Cyanistes caeruleus*				Green		Possible (2) Non-breeding (1)
BL	Brambling	*Fringilla montifringilla*		X	X	Green		Possible (1)
BG	Brent Goose	*Branta bernicla*				Amber	X	Possible (1)
CH	Chaffinch	*Fringilla coelebs*				Green		Probable (5) Possible (4) Non-breeding (2)
CC	Chiffchaff	*Phylloscopus collybita*				Green		Possible (1)

BTO Code	Common Name	Scientific Name	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Priority Species	Birds of Conservation Concern (BoCC)	At risk from windfarms (NatureScot 2018a)	Breeding Status (possible, probable, confirmed or non-breeding)
CT	Coal tit	*Periparus ater*				Green		Confirmed (1) Possible (4) Non-breeding (1)
CD	Collared dove	*Streptopelia decaocto*				Green		Confirmed (1) Possible (1)
CM	Common gull	*Larus canus*				Amber		Probable (5) Possible (5) Non-breeding (15)
WH	Whitethroat	*Curruca communis*				Amber		Possible (2) Non-breeding (1)
CK	Cuckoo	*Cuculus canorus*			X	Red		Probable (1) Possible (1)
CU	Curlew	*Numenius arquata*			X	Red	X	Probable(17) Possible (28) Non-breeding (10)
DI	Dipper	*Cinclus cinclus*				Amber		Possible (1)
D.	Dunnock	*Prunella modularis*				Amber		Non-breeding (1)
GW	Garden warbler	*Sylvia borin*				Green		Possible (2)
GP	Golden plover	*Pluvialis apricaria*	X		X	Green	X	Confirmed (1) Probable (14) Possible (14) Non-breeding (16)
GO	Goldfinch	*Carduelis carduelis*				Green		Probable (1) Possible (1)
GT	Great tit	*Parus major*				Green		Probable (1) Possible (1) Non-breeding (2)
H.	Grey heron	*Ardea cinerea*				Green		Non-breeding (1)
GL	Grey wagtail	*Motacilla cinerea*				Amber		Possible (2)
GJ	Greylag goose	*Anser anser*				Amber	X	Confirmed (2) Probable (1) Possible (1) Non-breeding (1)

BTO Code	Common Name	Scientific Name	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Priority Species	Birds of Conservation Concern (BoCC)	At risk from windfarms (NatureScot 2018a)	Breeding Status (possible, probable, confirmed or non-breeding)
HG	Herring gull	*Larus argentatus*			X	Red	X	Probable (1) Possible (1) Non-breeding (13)
HM	House martin	*Delichon urbicum*				Red		Non-breeding (2)
L.	Lapwing	*Vanellus vanellus*				Red	X	Confirmed (1) Probable (7) Possible (6) Non-breeding (9)
LR	Lesser redpoll	*Acanthis cabaret*			X	Red		Non-breeding (1)
MA	Mallard	*Anas platyrhynchos*				Amber		Possible (6)
M.	Mistle thrush	*Turdus viscivorus*				Red		Possible (2) Non-breeding (3)
OC	Oystercatcher	*Haematopus ostralegus*				Amber		Probable (2) Possible (8) Non-breeding (1)
PH	Pheasant	*Phasianus colchicus*				Introduced		Possible (7)
PW	Pied wagtail	*Motacilla alba*				Green		Possible (1) Non-breeding (1)
PM	Ptarmigan	*Lagopus muta*				Red		Non-breeding (1)
RN	Raven	*Corvus corax*				Green		Possible (1) Non-breeding (5)
RG	Red grouse	*Lagopus lagopus*			X	Green		Confirmed (3) Probable (14) Possible (31) Non-breeding (16)
RL	Red-legged partridge	*Alectoris rufa*				Introduced		Possible (1) Non-breeding (1)
RK	Redshank	*Tringa totanus*				Amber		Possible (1)
RZ	Ring ouzel	*Turdus torquatus*			X	Red		Probable (1) Possible (1) Non-breeding (2)
R.	Robin	*Erithacus rubecula*				Green		Confirmed (1) Possible (2) Non-breeding (2)

BTO Code	Common Name	Scientific Name	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Priority Species	Birds of Conservation Concern (BoCC)	At risk from windfarms (NatureScot 2018a)	Breeding Status (possible, probable, confirmed or non-breeding)
RO	Rook	*Corvus frugilegus*				Amber		Probable (1)
SM	Sand martin	*Riparia riparia*				Green		Confirmed (1) Probable (2) Possible (1) Non-breeding (2)
SN	Snipe	*Gallinago gallinago*				Amber		Possible (4) Non-breeding (2)
ST	Song thrush	*Turdus philomelos*			X	Amber		Confirmed (1) Possible (1) Non-breeding (5)
SF	Spotted flycatcher	*Muscicapa striata*			X	Red		Non-breeding (2)
SC	Stonechat	*Saxicola rubicola*				Green		Confirmed (1) Probable (9) Possible (11) Non-breeding (2)
SL	Swallow	*Hirundo rustica*				Green		Non-breeding (1)
SI	Swift	*Apus apus*			X	Red		Non-breeding (1)
W.	Wheatear	*Oenanthe oenanthe*				Amber		Probable (1) Possible (5) Non-breeding (2)
WM	Whimbrel	*Numenius phaeopus*		X		Red	X	Non-breeding (3)
WC	Whinchat	*Saxicola rubetra*				Red		Non-breeding (1)
WW	Willow warbler	*Phylloscopus trochilus*				Amber		Confirmed (1) Probable (9) Possible (21) Non-breeding (3)
WR	Wren	*Troglodytes troglodytes*				Amber		Confirmed (1) Probable (6) Possible (10) Non-breeding (2)

4.3.3 2023

Four Brown and Shepherd visits were carried out as detailed in Table 12, which meets NatureScot guidance (SNH, 2017b) requirements of four survey visits at least seven days apart between early April and the end of July. The study area for this survey focussed on the additional land to the south plus a 500m buffer (Appendix A, Figure 8.1.12a and 8.1.12b refers).

Table 12: Moorland Breeding Bird Survey Effort 2023

Survey Compartment Number	Visit Number	Date	Observer	Start time	Stop time	Duration
13	1	18/04/2023	JW / SS / AW	09:30	16:00	06:30
	2	22/05/2023	WG / SS	09:15	15:50	06:35
	3	17/07/2023	SS	09:25	15:45	06:20
	4	31/07/2023	SS	09:35	16:00	06:25
14	1	19/04/2023	SS/AW	09:30	15:55	06:25
	2	23/05/2023	WG / SS	09:30	16:00	06:30
	3	18/07/2023	SS	09:20	15:45	06:25
	4	01/08/2023	SS	09:25	16:00	06:35
15	1	20/04/2023	SS / AW	09:30	15:30	06:00
	2	24/05/2023	WG / SS	09:30	16:15	06:45
	3	19/07/2023	SS	09:15	15:45	06:30
	4	03/08/2023	SS	09:20	16:05	06:45

During the breeding bird survey, a total of 23 species were recorded (Appendix A, Figure 8.1.12a and 8.1.12b refers). Table 13 presents, alphabetically, each of the species in terms of their breeding status, conservation value, and whether they are considered to be at risk from wind farms (SNH, 2018). It also presents the species' breeding status at the Site.

Meadow pipit *Anthus praetensis* regularly occurred on the Site due to their density across the site, territory analysis was not undertaken.

Table 13: Breeding Bird Survey Recorded Species 2023

BTO Code	Common Name	Scientific Name	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Priority Species	Birds of Conservation Concern (BoCC)	At risk from windfarms (NatureScot 2018a)	Breeding Status (possible, probable, confirmed or non-breeding)
BZ	Buzzard	*Buteo buteo*				Green		Non-breeding (1)
C.	Carrion Crow	*Corvus corone*				Green		Non-breeding (5)
CH	Chiffchaff	*Phylloscopus collybita*				Green		Non-breeding (1)
CU	Curlew	*Numenius Arquata*			X	Red	X	Non-breeding (3)
D.	Dunnock	*Prunella modularis*				Amber		Non-breeding (1)
EA	Golden Eagle	*Aquila chrysaetos*	X	X		Green	X	Non-breeding (1)
GP	Golden plover	*Pluvialis apricaria*	X		X	Green	X	Probable (1) Possible (4) Non-breeding (5)

BTO Code	Common Name	Scientific Name	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Priority Species	Birds of Conservation Concern (BoCC)	At risk from windfarms (NatureScot 2018a)	Breeding Status (possible, probable, confirmed or non-breeding)
HC	Hooded Crow	*Corvus cornix*				Not-Listed		Non-breeding (2)
K.	Kestrel	*Falco tinnunculus*				Amber		Confirmed (1) Non-breeding (1)
L.	Lapwing	*Vanellus vanellus*				Red	X	Non-breeding (2)
P.	Grey partridge	*Perdix perdix*				Red		Confirmed (1) Non-breeding (1)
RG	Red Grouse	*Lagopus lagopus*				Green		Confirmed (3) Probable (4) Possible (9) Non-breeding (6)
RL	Red-Legged Partridge	*Alectoris rufa*						Possible (1)
KT	Red Kite	*Milvus milvus*	X	X	X	Green	X	Non-breeding (6)
RN	Raven	*Corvus Corax*				Green		Possible (1) Non-breeding (1)
RZ	Ring Ouzel	*Turdus torquatus*			X	Red		Possible (1)
S.	Skylark	*Alauda arvensis*				Red		Confirmed (1) Possible (3) Non-breeding (2)
SC	Stonechat	*Saxicola rubicola*				Green		Possible (2) Non-breeding (3)
SG	Starling	*Sturnus vulgaris*				Red		Possible (1) Non-breeding (1)
SI	Swift	*Apus apus*			X	Red		Non-breeding (1)
TT	Turnstone	*Arenaria interpres*				Amber		Non-breeding (1)
W.	Wheatear	*Oenanthe oenanthe*				Amber		Possible (1) Non-breeding (1)
WR	Wren	*Troglodytes troglodytes*				Amber		Confirmed (2) Probable (1) Possible (2) Non-breeding (3)

4.4 Breeding Raptor Survey Results

4.4.1 2021

A total of 24 breeding raptor survey days were carried out over five months at the Site as detailed in Table 14. The survey included a 2km buffer encompassing the Proposed Development Site.

Table 14: Breeding Raptor Survey Effort 2021

Visit Number	Date	Observer	Start time	Stop time	Duration
1	21/04/2021	AD	08:30	16:45	08:15
	23/04/2021	AD	08:15	16:30	08:15
	26/04/2021	AD	08:15	16:30	08:15
	27/04/2021	AD	08:00	16:30	08:30
	28/04/2021	AD	08:30	16:30	08:00
2	25/05/2021	SL / SD	09:00	16:00	07:00
	02/06/2021	SL	09:20	16:05	06:45
	03/06/2021	SL	09:15	16:20	07:05
	04/06/2021	SL	09:15	16:00	06:45
3	04/06/2021	IM	08:30	16:30	08:00
	08/06/2021	IM	08:00	16:00	08:00
	09/06/2021	DB	08:55	15:30	06:35
	09/06/2021	SL	09:15	15:50	06:35
	10/06/2021	SL	09:00	16:00	07:00
	10/06/2021	DB	09:20	12:40	03:20
	11/06/2021	SL	09:30	16:30	07:00
4	05/07/2021	KT	10:30	16:30	06:00
	06/07/2021	KT	09:45	17:00	07:15
	12/07/2021	MC	11:30	16:00	04:30
	12/07/2021	SD	10:00	16:00	06:00
	13/07/2021	SD / MC	09:30	16:00	06:30
	17/08/2021	SD	10:45	16:45	06:00

Seven Annex 1 / Schedule 1 species were recorded on Site as shown in Table 15. Observations of all raptors recorded during these surveys are presented in Appendix A, Figures 8.1.13 – 8.1.16 refer (and in Figures 8.2.3 and 8.2.4 of Technical Appendix 8.2).

Table 15: Breeding Status of Annex 1 and Schedule 1 Raptors Observed During 2021 Season

Raptor species	Scientific Name	Breeding status	No. of registrations
Golden eagle	*Aquila chrysaetos*	Non-breeding	33
Hen harrier	*Circus cyaneus*	Non-breeding	1
Merlin	*Falco columbarius*	Probable	4
Peregrine	*Falco peregrinus*	Non-breeding	2
Red kite	*Milvus milvus*	Probable	87
Short-eared owl	*Asio flammeus*	Possible	5
White-tailed eagle	*Haliaeetus albicilla*	Non-breeding	13

Red kite displayed the most activity with 87 recorded sightings throughout the Site. Merlin were recorded on four occasions with recorded activity suggestive of an occupied territory. Short-eared owl were observed on five occasions around the approximate centre of the Site.

Despite both golden eagle and white-tailed eagle being observed throughout the breeding season, there was no indication of an eyrie being established on Site for either species. Eagle home ranges are large, so the Site is considered highly likely to form part of a home range with birds breeding outwith the survey area and using the Site to hunt and forage.

Buzzard *Buteo buteo* and kestrel *Falco tinnunculus* were also frequently observed on Site.

4.4.2 2022

A total of 22 breeding raptor survey days were carried out over five months at the Site as detailed in Table 16. The survey included a 2km buffer encompassing the Proposed Development Site.

Table 16: Breeding Raptor Survey Effort 2022

Visit Number	Date	Observer	Start time	Stop time	Duration
1	25/04/2022	CG	10:10	15:00	04:50
	28/04/2022	BW	09:30	16:00	06:30
2	24/05/2022	ADK	10:00	16:30	06:30
	24/05/2022	CF	10:00	16:30	06:30
	26/05/2022	ADK	09:20	16:00	06:40
	27/05/2022	ADK	09:10	16:05	06:55
3	14/06/2022	CF	13:00	18:00	05:00
	15/06/2022	CF	11:00	17:00	06:00
	15/06/2022	SL / CB	09:30	14:00	04:30
	17/06/2022	CF	10:00	15:00	05:00
	29/06/2022	JE / TJC	09:30	14:00	04:30
	29/06/2022	CF	10:00	16:00	06:00
4	06/07/2022	JE	09:00	14:30	05:30
	12/07/2022	TJC / DMcK	10:30	16:00	05:30
	13/07/2022	ADK	09:45	16:00	06:15
	04/08/2022	JE	09:00	15:00	06:00
	05/08/2022	JE	09:00	15:00	06:00
	08/08/2022	CM	09:15	16:45	07:30

Six Annex 1 / Schedule 1 species were recorded on Site as shown in Table 17. Observations of all raptors recorded during these surveys are presented in Appendix A, Figures 8.1.17 – 8.1.20 refer (and in Figures 8.2.5 and 8.2.6 of Technical Appendix 8.2).

Table 17: Breeding Status of Annex 1 and Schedule 1 Raptors Observed During 2022 Season

Raptor species	Scientific Name	Breeding status	No. of registrations
Golden eagle	*Aquila chrysaetos*	Non-breeding	6
Hen harrier	*Circus cyaneus*	Non-breeding	2

Raptor species	Scientific Name	Breeding status	No. of registrations
Merlin	*Falco columbarius*	Possible	2
Osprey	*Pandion haliaetus*	Non-breeding	1
Red kite	*Milvus milvus*	Probable	32
White-tailed eagle	*Haliaeetus albicilla*	Non-breeding	1

Red kite displayed the most activity with 32 recorded sightings throughout the Site.

Despite both golden eagle and white-tailed eagle being recorded from all ornithology surveys throughout the breeding season, there was no indication of an eyrie being established on Site for either species. Eagle home ranges are large, so the Site is considered highly likely to form part of a home range with birds breeding outwith the survey area and using the Site to hunt and forage.

A single osprey was observed soaring along the River Findhorn, north of An Socach.

Two observations of merlin were also recorded.

Buzzard and kestrel were also frequently observed on Site, with kestrel showing behaviour indicative of a confirmed breeding territory.

4.4.3 2023

A total of 12 breeding raptor survey days were carried out over four months at the Site as detailed in Table 18. The survey included a 2km buffer encompassing the Proposed Development Site.

Table 18: Breeding Raptor Survey Effort 2023

Visit Number	Date	Observer	Start time	Stop time	Duration
1	24/03/2023	ADK	09:10	14:15	05:05
	27/03/2023	BW	10:00	16:00	06:00
	31/03/2023	BW	09:45	15:45	06:00
2	02/05/2023	WG	09:30	15:45	06:15
	04/05/2023	WG	09:30	16:00	06:30
	05/05/2023	WG	09:30	15:45	06:15
3	12/06/2023	SS	10:30	17:00	06:30
	13/06/2023	SS	10:30	16:30	06:00
	21/06/2023	SS	10:30	17:30	07:00
4	24/07/2023	SS / GB	10:00	16:30	06:30
	26/07/2023	GB	10:00	16:30	06:30
	01/08/2023	SS	10:30	18:30	08:00

Two Annex 1 / Schedule 1 species were recorded on Site as shown in Table 19. Observations of all raptors recorded during these surveys are presented in Appendix A, Figure 8.1.21 refers.

Table 19: Breeding Status of Annex 1 and Schedule 1 Raptors Observed During 2023 Season

Raptor species	Scientific Name	Breeding status	No. of registrations
Golden eagle	*Aquila chrysaetos*	Non-breeding	3
Red kite	*Milvus milvus*	Non-breeding	6

Raptor species	Scientific Name	Breeding status	No. of registrations
White-tailed eagle	*Haliaeetus albicilla*	Confirmed	1 (Confirmed) 1 (Non-breeding)

Neither golden eagle, red kite or white-tailed eagle were recorded as breeding on the Site, but an occupied white-tailed eagle nest was recorded beyond the River Dulnain to the south-east in Kinveachy Forest.

Buzzard and kestrel were also frequently observed on Site.

4.5 Black Grouse Survey

4.5.1 2021

Following preparatory visits on which suitable black grouse habitat was identified as well as a review of data provided by RSPB showing historic lek sites, supplemented by anecdotal evidence from the estate, black grouse surveys were undertaken (Table 20 refers).

Table 20: Black Grouse Survey Effort 2021

Date	Observer	Survey Type	Survey Area	Start time	Stop time	Duration
21/04/2021	AD	Habitat Assessment	Around VPs 5 and 6	08:00	10:00	02:00
23/04/2021	AD	Dawn Lek Count	Around VPs 5 and 6	05:30	08:30	03:00
19/05/2021	JW	Dawn Lek Count	Around VP6	05:00	08:00	03:00
20/05/2021	JW	Dawn Lek Count	Around VP5	05:00	08:00	03:00

Despite an incidental record of a single black grouse male by estate staff as well as the recovery of black grouse feathers, no black grouse leks were recorded during any of the surveys.

4.5.2 2022

A repeat of the 2021 surveys was undertaken in April 2022 covering previously identified areas including locations of historic lek sites (Table 21 refers).

Table 21: Black Grouse Survey Effort 2022

Date	Observer	Survey Type	Survey Area	Start time	Stop time	Duration
11/04/2022	CG	Dawn Lek Count	Around VP 6	06:00	09:00	03:00
20/04/2022	DMcK / SL	Dawn Lek Count	Around VP 5	06:00	09:00	03:00

No black grouse were recorded on either survey.

4.5.3 2023

An initial survey was undertaken in April 2023 with the aim being to identify suitable black grouse habitat (Table 22 refers).

Table 22: Black Grouse Survey Effort 2023

Date	Observer	Survey Type	Survey Area	Start time	Stop time	Duration
12/04/2023	SS / WG	Habitat Assessment	Additional Site Area on Seafield Estate	10:25	14:10	02:45

In the absence of historical locational data of leks, and that suitable habitat was not identified within the survey area, no follow-up dawn lek counts were undertaken.

5 Collision Risk Modelling

Collision risk modelling was carried out for 10 species for which levels of flight activity recorded over the Proposed Development Site during 36 months of VP surveys (September 2020 – August 2022, and then January – December 2023) were deemed reasonable for such an assessment.

To account for the variability in the duration of surveys (i.e. September 2020 to August 2022, and then January to December 2023), two CRM models were utilised. The first used flight data recorded from VPs 8 – 10, and the second used flight data recorded from VPs 12 and 13. Each model therefore only used the number of turbines which fell within the viewsheds for the VPs from which data was used. The results of the two models were then summed to produce an overall collision risk estimate for each species for the Site.

In this instance, CRM has been undertaken for the following species:

- Curlew;
- Golden eagle;
- Golden plover;
- Greylag goose;
- Hen harrier;
- Lapwing;
- Peregrine;
- Pink-footed goose;
- Red kite; and
- White-tailed eagle.

Flights included in the calculations were all those recorded within the viewsheds of the VP locations during survey times (i.e. not including incidental records) and recorded at collision risk height.

Appendix A, Figure 8.1.3 presents the viewsheds for all VPs (current and discontinued). While VP surveys were conducted over a wide area initially to accommodate all possible design iterations, collision risk modelling is based on those VP locations that overlook the final design turbine envelope (specifically VPs 8, 9, 10, 12 and 13).

All flights recorded at risk height during the VP survey times were included in the CRM calculations, and a worked example of the model is presented in Appendix G.

A model (Forsythe *et al.*, 1995) was used to calculate the daytime length as a function of latitude (57°17'1"N for the centre of the proposed Clune wind farm) and date (2020 and 2023). The VP data was analysed for seasonal presence of a species on Site (Appendix E). Table 23 and Table 24 present the turbine parameters used for in both models.

Table 23: Turbine Parameters (September 2020 – August 2022)

Parameter	Dimensions	Unit
Number of turbines	18	
Blades per turbine	3	
Hub height	119	metres

Parameter	Dimensions	Unit
Rotor radius	81	metres
Maximum chord	4.6	metres
Pitch	15	degrees
Rotation period	4	seconds
Proportion operational	0.85	

Table 24: Turbine Parameters (January – December 2022)

Parameter	Dimensions	Unit
Number of turbines	12	
Blades per turbine	3	
Hub height	119	metres
Rotor radius	81	metres
Maximum chord	4.6	metres
Pitch	15	degrees
Rotation period	4	seconds
Proportion operational	0.85	

5.1 Random Collision Risk Model

The general methodology used to predict collision risk for birds using the wind farm airspace is provided by NatureScot (SNH, 2009a).

In summary, the following steps were followed for random bird movements (as assumed for all species) in this assessment:

- Digitise all flight lines and record relevant characteristics (including species, number of birds, start time of flight and time within each height band) in database;
- Review the flight line data, which in this instance indicated that a random collision analysis should be conducted for each species;
- Identify all flights for each species that are at any point within the 'at risk' height band and sum the total 'at risk' flight duration for each VP, multiplying any flight at risk time by the number of birds observed, where more than one bird is recorded per flight line;
- Calculate an 'occupancy rate' for each vantage point, defined as the observed 'at risk' activity levels divided by total observation time and area observed, giving the occupancy per unit time and unit area for each VP;
- Average the occupancy rate across the VPs using an un-weighted mean approach;
- Apply the average occupancy rate to the wind development Site, based on the Site area, risk volume and total turbine rotor volume, applying a factor to estimate the total time that the birds could theoretically be active during the year, based on an algorithm for calculating day length (Forsythe et al. 1995); thus determining the total predicted time spent by the individual species within air space that could be swept by turbine blades;

- Run the collision model with relevant turbine and ornithological parameters to calculate the theoretical probability of transits resulting in a collision assuming no avoiding action;
- Multiply the number of transits by the collision rate, avoidance factor and operating parameters of the proposed wind farm to estimate the theoretical number of collisions per year; and
- Avoidance rates used were in accordance with NS guidance (SNH, 2017a).

The predicted mortality through collision is dependent on a number of variables, including flight activity within the turbine envelope, the species' physiology, nocturnal flight behaviour and flight velocity, weather conditions, the predicted avoidance rate, the number, rotational speed and dimensions of the turbines, and the proportion of the time that the turbines are operational throughout the year.

The following assumptions were made for the various species:

- A daylight calculator was used to produce figures for the total daylight period at the proposed development Site;
- Biometric data (bird length and wingspan) for the various species were obtained from the BTO webpage; and
- An assessment was made on the months active at the Site for each species, with some species resident and others seasonal visitors. All species were considered active during the day only.

Table 25 and Table 26 present a summary of the model used for each species, biometric parameters, avoidance rates and the seasons during which the species was present on Site for each model.

Table 25: Random CRM Biometric Parameters (September 2020 – August 2022)

Species	Bird length (m)	Wingspan (m)	Bird speed (m/s)	Avoidance rate	Months active	Daylight hours	Nocturnal hours	Total hours	Assumed activity period	Flapping / gliding
Curlew	0.55	0.9	16.3	0.980	Mar - Aug	2852.13	0.00	2852.13	Daylight hours only	F
Golden eagle	0.82	2.12	11.9	0.990	All year	4510.95	0.00	4510.95	Daylight hours only	F
Golden plover	0.28	0.72	13.7	0.980	Feb - Aug	3125.87	781.47	3907.34	Daylight hours plus 25% nocturnal hours	F
Greylag goose	0.82	1.64	17.1	0.998	Sept – May	2970.81	0.00	2970.81	Daylight hours only	F
Hen harrier	0.48	1.10	9.1	0.990	All year	4510.95	0.00	4510.95	Daylight hours only	G

Species	Bird length (m)	Wingspan (m)	Bird speed (m/s)	Avoidance rate	Months active	Daylight hours	Nocturnal hours	Total hours	Assumed activity period	Flapping / gliding
Lapwing	0.30	0.84	12.8	0.980	Mar - Aug	2852.13	0.00	2852.13	Daylight hours only	F
Peregrine	0.42	1.02	12.1	0.980	All year	4510.95	0.00	4510.95	Daylight hours only	F
Pink-footed goose	0.68	1.52	17.1	0.998	Sept-Mar	2026.49	0.00	2026.49	Daylight hours only	F
Red kite	0.63	1.85	12	0.99	All year	4510.95	0.00	4510.95	Daylight hours only	G
White-tailed eagle	0.8	2.2	13.6	0.95	All year	4510.95	0.00	4510.95	Daylight hours only	F

Table 26: Random CRM Biometric Parameters (January – December 2023)

Species	Bird length (m)	Wingspan (m)	Bird speed (m/s)	Avoidance rate	Months active	Daylight hours	Nocturnal hours	Total hours	Assumed activity period	Flapping / gliding
Curlew	0.55	0.9	16.3	0.980	Mar - Aug	2848.65	0.00	2848.65	Daylight hours only	F
Golden eagle	0.82	2.12	11.9	0.990	All year	4504.20	0.00	4504.20	Daylight hours only	F
Golden plover	0.28	0.72	13.7	0.980	Feb - Aug	3111.84	777.96	3889.80	Daylight hours plus 25% nocturnal hours	F
Greylag goose	0.82	1.64	17.1	0.998	Sept – May	2960.62	0.00	2960.62	Daylight hours only	F
Hen harrier	0.48	1.10	9.1	0.990	All year	4504.20	0.00	4504.20	Daylight hours only	G
Lapwing	0.30	0.84	12.8	0.980	Mar - Aug	2848.65	0.00	2848.65	Daylight hours only	F

Species	Bird length (m)	Wingspan (m)	Bird speed (m/s)	Avoidance rate	Months active	Daylight hours	Nocturnal hours	Total hours	Assumed activity period	Flapping / gliding
Peregrine	0.42	1.02	12.1	0.980	All year	4504.20	0.00	4504.20	Daylight hours only	F
Pink-footed goose	0.68	1.52	17.1	0.998	Sept-Mar	2020.68	0.00	2020.68	Daylight hours only	F
Red kite	0.63	1.85	12	0.99	All year	4504.20	0.00	4504.20	Daylight hours only	G
White-tailed eagle	0.8	2.2	13.6	0.95	All year	4504.20	0.00	4504.20	Daylight hours only	F

Table 27 presents the results of the random model for 24 months (September 2020 - August 2022) and Table 28 presents the results of the random model for 12 months (January – December 2023). A worked example for the models is included in Appendix G.

Table 27: Random CRM Results (September 2020 – August 2022)

Species	Annual collision risk	Years per collision	Collisions over 40 years
Curlew	0.135	7.4	5.4
Golden eagle	0.254	3.9	10.16
Golden plover	0.010	101.8	0.4
Greylag goose	1.331	0.8	53.24
Hen harrier	0.017	58.8	0.68
Lapwing	0.065	15.3	2.6
Peregrine	0.024	42.3	0.96
Pink-footed goose	1.881	0.5	75.24
Red kite	0.552	1.8	22.08
White-tailed eagle	0.501	2.0	20.04

Table 28: Random CRM Results (January – December 2023)

Species	Annual collision risk	Years per collision	Collisions over 40 years
Curlew	0.000	0.0	0.0
Golden eagle	0.023	43.2	0.92
Golden plover	0.018	55.5	0.72
Greylag goose	0.058	17.3	2.32
Hen harrier	0.000	0.0	0.0
Lapwing	0.000	0.0	0.0
Peregrine	0.000	0.0	0.0

Species	Annual collision risk	Years per collision	Collisions over 40 years
Pink-footed goose	0.000	0.0	0.0
Red kite	0.129	7.8	5.16
White-tailed eagle	0.469	2.1	18.76

Total overall collision risk estimates for each species for the Site are provided in Table 29.

Table 29: Random CRM Results (Final Collision Risk Estimates)

Species	Annual collision risk	Years per collision	Collisions over 40 years
Curlew	0.135	7.4	5.4
Golden eagle	0.277	3.6	11.08
Golden plover	0.028	35.71	1.12
Greylag goose	1.389	0.7	55.56
Hen harrier	0.017	58.8	0.68
Lapwing	0.065	15.3	2.6
Peregrine	0.024	42.3	0.96
Pink-footed goose	1.881	0.5	75.24
Red kite	0.681	1.5	27.24
White-tailed eagle	0.97	1.0	38.8

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Appendices

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Figure 8.1.9 - Vantage Point Activity – Raptors and Geese January 2023 –

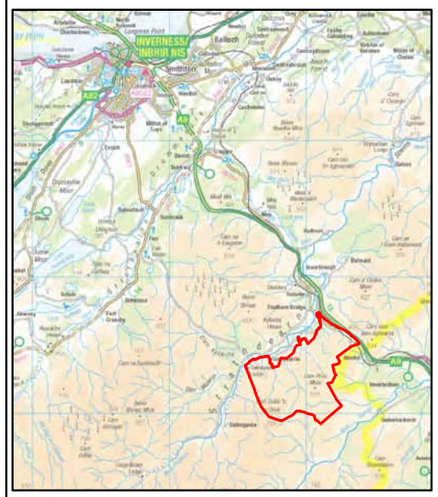
December 2023

Clune Wind Farm

Figure 8.1.1
Site location Plan

Key

Site boundary



0 0.5 1 2

Kilometres

N

Scale @ A3:
1:35,000

04/09/2024 64600/BP/074f

Drawn by: KM Checked by: TH Approved by: JW

Clune Wind Farm

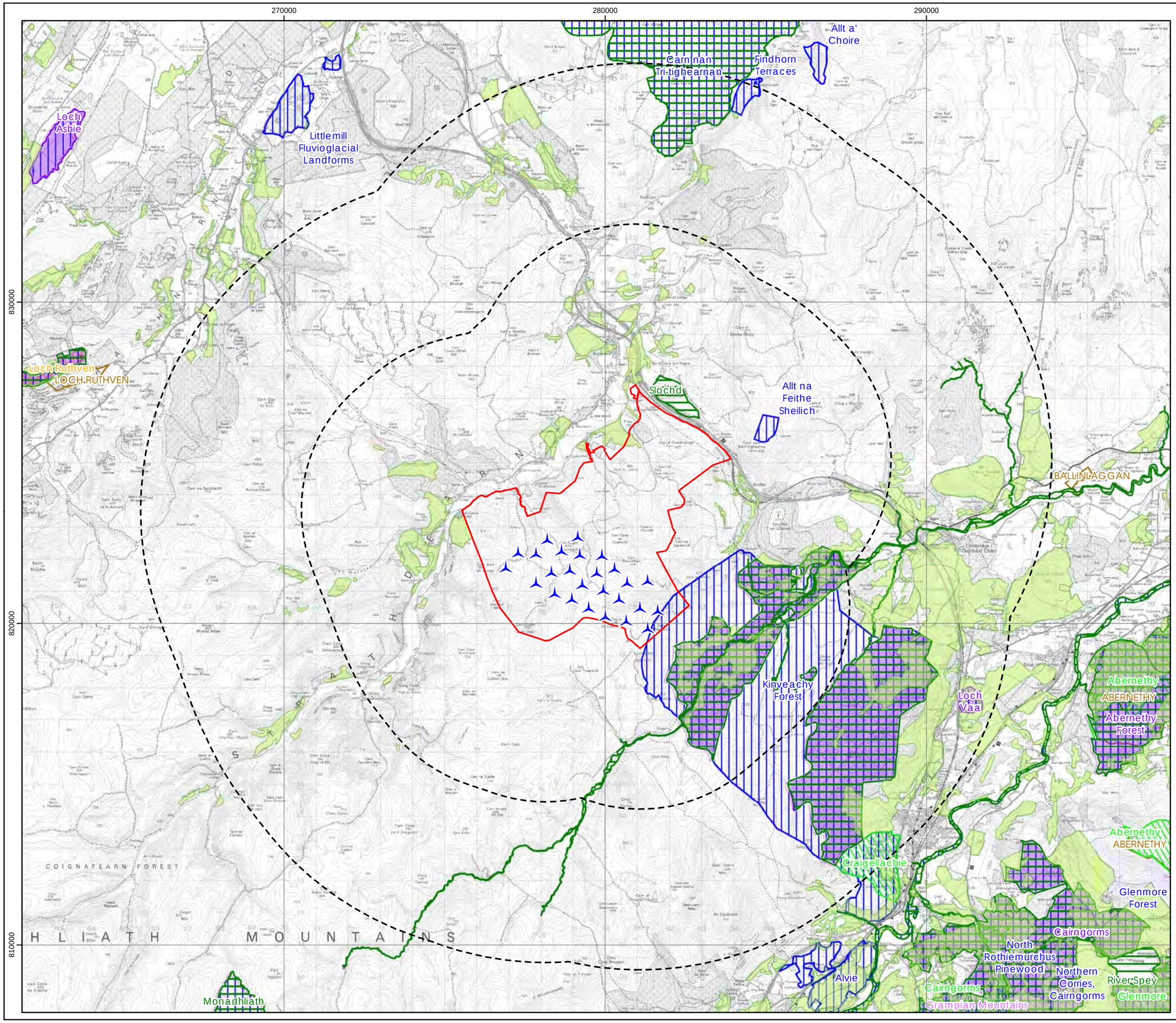


Figure 8.1.2
Designated Sites within 10 km

Key

- Site boundary
- 5km and 10km site buffers
- Proposed turbine
- Ancient Woodland Inventory
- Special Area of Conservation
- Special Protection Area
- National Nature Reserve
- Site of Special Scientific Interest
- RSPB Reserve
- Ramsar wetland
- RSPB Important Bird Areas

0 1.25 2.5 5
Kilometres

N

Scale @ A3:
1:110,000

04/09/2024 64600/OR/075f
Drawn by: KM Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.3
Vantage Point Locations and Viewsheds

Key

- Site boundary
- Forestry
- Site of Special Scientific Interest
- Special Protection Area
- Proposed turbine layout
- Vantage point (Vps 1-4 not surveyed after March 2021)

Viewshed
20m above ground

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

Generated using Ordnance Survey's Terrain 50 dataset that does not take into account the screening effects of buildings.

Observer height 1.5m above ground.
Viewshed height modelled 20m above ground.

Forestry has been used to screen visibility at a height of 10m using the Ordnance Survey OpenMapLocal Woodland dataset.

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:50,000

25/10/2024 PSCOCLU041 64600/OR/076d
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.4a
Vantage Point Activity - Red Kite
September 2020 - February 2021

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Red Kite

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/136a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.4b
Vantage Point Activity - Red Kite
March 2021 - August 2021

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Red Kite

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/137a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.4c
Vantage Point Activity - Red Kite
September 2021 - February 2022

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Red Kite

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/138a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.4d
Vantage Point Activity - Red Kite
March 2022 - August 2022

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Red Kite

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/139a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.4e
Vantage Point Activity - Red Kite
Janurary 2023 - December 2023

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Red Kite (Breeding)
- Red Kite (Non-breeding)

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

Breeding refers to activity March - August
Non-breeding refers to activity January - February and September - December

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/140a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.5a
Vantage Point Activity - Eagles
September 2020 - February 2021

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Golden Eagle (Breeding)
- White-tailed Eagle (Breeding)

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/141a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.5b
Vantage Point Activity - Eagles
March 2021 - August 2021

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Golden Eagle
- White-tailed Eagle

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/142a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.5c
Vantage Point Activity - Eagles
September 2021 - February 2022

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Golden Eagle
- White-tailed Eagle

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/143a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.5d
Vantage Point Activity - Eagles
March 2022 - August 2022

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Golden Eagle
- White-tailed Eagle

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/144a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.5e
Vantage Point Activity - Eagles
January 2023 - December 2023

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Golden Eagle (Breeding)
- White-tailed Eagle (Breeding)
- Golden Eagle (Non-breeding)
- White-tailed Eagle (Non-breeding)

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

Breeding refers to activity March - August
Non-breeding refers to activity January - February and September - December

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/145a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.6a
Vantage Point Activity - Geese
September 2020 - February 2021

Key

Site boundary
Proposed turbines
Vantage Point

Target species registrations

Canada Goose
Greylag Goose
Pink-footed Goose

Height Band

Below 20m height
20 - 220m height
Above 220m height
On ground
Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/146a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.6b
Vantage Point Activity - Geese
March 2021 - August 2021

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Greylag Goose
- Pink-footed Goose

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/147a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.6c
Vantage Point Activity - Geese
September 2021 - February 2022

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Bean Goose
- Canada Goose
- Greylag Goose
- Pink-footed Goose

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/148a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.6d
Vantage Point Activity - Geese
March 2022 - August 2022

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Greylag Goose
- Pink-footed Goose

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/149a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.7a
Vantage Point Activity - Curlew
September 2020 - August 2022

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Curlew

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/150a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.7b
Vantage Point Activity - Waders
September 2020 - August 2022

Key

Site boundary
Proposed turbines
Vantage Point

Target species registrations

Lapwing
Snipe
Woodcock

Height Band

Below 20m height
20 - 220m height
Above 220m height
On ground
Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/151a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.7b
Vantage Point Activity - Waders
September 2020 - August 2022

Key

Site boundary
Proposed turbines
Vantage Point

Target species registrations

Lapwing
Snipe
Woodcock

Height Band

Below 20m height
20 - 220m height
Above 220m height
On ground
Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/151a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.7c
Vantage Point Activity - Waders
September 2020 - August 2022

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Golden Plover
- Oystercatcher
- Green Sandpiper
- Little Ringed Plover
- Unidentified Wader

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/152a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.7d
Vantage Point Activity - Waders
Janurary 2023 - December 2023

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Curlew
- Greenshank
- Golden Plover

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/153a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.8a
Vantage Point Activity - Raptors
September 2020 - August 2022

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Goshawk
- Hen Harrier
- Merlin
- Osprey
- Peregrine
- Short-eared owl

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/154a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.8b
Vantage Point Activity -
Other Species
September 2020 - August 2022

Key

Site boundary
Proposed turbines
Vantage Point

Target species registrations

Common Tern
Fulmar
Goosander
Iceland Gull
Mute Swan

Height Band

Below 20m height
20 - 220m height
Above 220m height
On ground
Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/155a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.9
Vantage Point Activity
Raptors & Geese
January 2023 - December 2023

Key

- Site boundary
- Proposed turbines
- Vantage Point

Target species registrations

- Goshawk
- Merlin
- Greylag Goose

Height Band

- Below 20m height
- 20 - 220m height
- Above 220m height
- On ground
- Heard only

0 0.5 1 2
Kilometres

N

Scale @ A3:
1:45,000

25/10/2024 PSCOCLU041 64600/OR/156a
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.10a
2021 Breeding Bird
Survey Results - Overview

Key

- Site boundary
- Survey compartments
- 1km turbine layout buffer
- Proposed turbine
- Proposed Infrastructure

Breeding Status

- Schedule 1/Annex 1
- Scottish Priority Species
- Not designated

Breeding Status

- Confirmed
- Probable
- Possible
- Non-breeding

Red listed species - BOCC
Amber listed species - BOCC

0 1 2
Kilometres

N

Scale @ A3:
1:50,000

25/10/2024 PSCOCLU041 64600/OR/092c
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.10b
2021 Breeding Bird
Survey Results - Map 1

Key

- Site boundary
- Survey compartments
- 1km turbine layout buffer

Breeding Status

- Schedule 1/Annex 1
- Scottish Priority Species
- Not designated

Breeding Status

- Confirmed
- Probable
- Possible
- Non-breeding

Red listed species - BOCC
Amber listed species - BOCC

0 0.25 0.5
Kilometres

N

Scale @ A3:
1:10,000

25/10/2024 PSCOCLU041 64600/OR/092c
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.10c
2021 Breeding Bird
Survey Results - Map 2

Key

- Site boundary
- Survey compartments
- 1km turbine layout buffer
- Proposed turbine
- Proposed Infrastructure

Breeding Status

- Schedule 1/Annex 1
- Scottish Priority Species
- Not designated

Breeding Status

- Confirmed
- Probable
- Possible
- Non-breeding

Red listed species - BOCC
Amber listed species - BOCC

0 0.3 0.6
Kilometres

N

Scale @ A3:
1:12,000

25/10/2024 PSCOCLU041 64600/OR/092c
Drawn by: AF Checked by: TH Approved by: JW

Clune Wind Farm

Figure 8.1.10d
2021 Breeding Bird
Survey Results - Map 3

277000 278000 279000 280000

824000 823000 822000 821000

Key

- Site boundary
- Survey compartments
- 1km turbine layout buffer
- Proposed turbine
- Proposed Infrastructure

Breeding_Status

- Schedule 1/Annex 1
- Scottish Priority Species
- Not designated

Breeding_Status

- Confirmed
- Probable
- Possible
- Non-breeding

Red listed species - BOCC
Amber listed species - BOCC

0 0.35 0.7
Kilometres

N

Scale @ A3:
1:14,000

25/10/2024 PSCOCLU041 64600/OR/092c
Drawn by: AF Checked by: TH Approved by: JW