Appendix 11C
Eredine Ornithology Methods

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Eredine wind farm

Ornithology surveys – methodology consultation document

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1. Introduction

This document provides information about ornithological surveys being undertaken and planned at EON's proposed Eredine wind farm in Kintyre.

1.1. Project Details

The proposed Eredine wind farm is approximately 11km south west of Inverary, north of a line joining Beinn Dearg, Loch Leacann and Beinn Laoigh, adjoining the An Suidhe wind farm to the north and the A' Chruach wind farm is 2.5km south west of the site. The site, approximately 24km^2, is mainly commercial conifer plantation with a mix of closed canopy forest, new planting and extensive areas of clear-fell (Fig. 1.1). The open, unforested ground is mainly grassland. The topography is quite complex but is mainly ridges running SW to NE with an altitude range of approximately 215m to 490m, with the majority between 300 and 400m. There are approximately 40 lochans of various sizes scattered across the site. There are no Special Protection Areas within 10km of the site boundary.

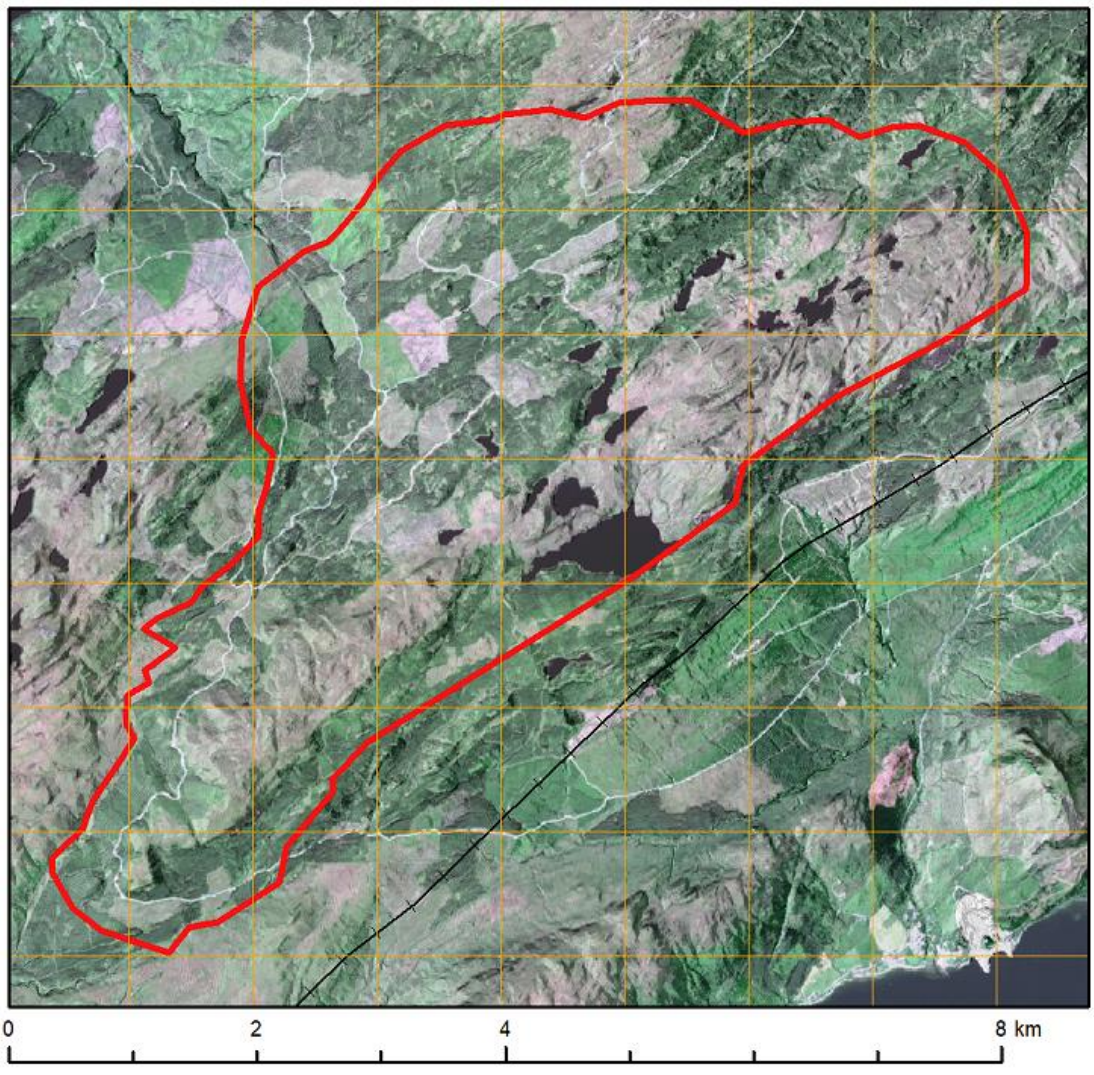

Figure 1.1. Overview map of the proposed Eredine wind farm

Contains Ordnance Survey data © Crown copyright and database right 2017. Background image is a Sentinel 2 image captured on 27 June 2019.

2. Survey Methodology

2.1. Breeding Bird Surveys

More than 260 hours of breeding bird surveys have been undertaken (Table 2.1) on 24 different days. Surveys were frequently combined so it is difficult to assign hours to individual survey types.

2.2. Moorland Breeding Bird Surveys

Moorland Breeding Bird Surveys began on April 17th 2019 and 12 surveys were completed by July 19th 2019. The surveys used an adapted Brown and Shepherd (1993) method[1] as recommended by current SNH guidance (SNH, 2017)[2]. Survey areas covered all appropriate habitat within the proposed site boundary. Table 2.1 lists the survey details. Experienced surveyors (Scott Smith and Aidan MacCormick) carried out all surveys. The behaviours of birds seen and heard during the walkover are recorded following standard British Trust for Ornithology guidelines. Winter Walkover Surveys (open habitat focusing on waders/wildfowl) will take place on one day per month from September to February. Surveys will be repeated in 2020.

Table 2.1 Moorland Breeding Bird (BBS), Golden Eagle and Raptor, Black Grouse (BK) ,Diver surveys and Winter Walkover Surveys carried out in 2019 (to September 17th).

Date	Surveyor	Survey type	Start	End	Duration
26/03/2019	SS	Eagle & Raptor	06:20	09:15	02:55
26/03/2019	SS	Eagle & Raptor	16:15	18:40	02:25
26/03/2019	AM	Raptor	14:35	18:30	03:55
27/03/2019	SS	Eagle & Raptor	06:15	07:30	01:15
27/03/2019	SS	Eagle & Raptor	14:00	18:45	04:45
27/03/2019	AM	Raptor	14:50	18:30	03:40
28/03/2019	SS	Black grouse	05:10	07:45	02:35
28/03/2019	AM	Black grouse	05:30	08:30	03:00
28/03/2019	SS	Eagle & Raptor	07:45	18:00	10:15
28/03/2019	AM	Raptor	15:10	17:30	02:20
29/03/2019	SS	Black grouse	05:10	08:00	02:50
16/04/2019	SS	Eagle & Raptor	06:05	12:30	06:25
16/04/2019	AM	Raptor	06:30	12:30	06:00
17/04/2019	SS	Black grouse	05:25	07:50	02:25
17/04/2019	AM	Black grouse & Raptor	06:00	08:30	02:30
17/04/2019	AM	Black grouse & Raptor	15:20	18:00	02:40
17/04/2019	SS	Breeding bird & Diver	14:20	18:00	03:40
18/04/2019	SS	Eagle & Raptor	06:00	18:20	12:20
18/04/2019	AM	Raptor	13:00	18:20	05:20
19/04/2019	SS	Breeding bird	05:15	10:00	04:45

[1] Brown, A.F. & Shepherd, K.B. 1993. A method for censusing upland breeding waders. Bird Study, 40, 189-195.
[2] Scottish Natural Heritage (SNH). 2017. Recommended bird survey methods to inform impact assessment of onshore wind farms. SNH, Battleby.

19/04/2019	SS	Black grouse	05:15	08:00	02:45
19/04/2019	AM	Black grouse & Diver	06:00	10:30	04:30
21/05/2019	SS	Eagle & Raptor	11:20	18:20	07:00
21/05/2019	AM	Raptor	12:40	18:40	06:00
22/05/2019	SS	Black grouse	04:20	06:45	02:25
22/05/2019	AM	Breeding bird	05:30	10:40	05:10
22/05/2019	AM	Breeding bird	17:10	18:10	01:00
22/05/2019	SS	Breeding bird & Diver	13:15	18:20	05:05
23/05/2019	AM	Black grouse & Diver	05:30	07:30	02:00
23/05/2019	AM	Breeding bird	14:00	17:30	03:30
23/05/2019	SS	Eagle & Raptor	05:50	18:25	12:35
24/05/2019	SS	Black grouse & Breeding bird	04:45	08:00	03:15
24/05/2019	AM	Black grouse	05:30	08:30	03:00
18/06/2019	SS	Raptor & Diver	12:20	18:30	06:10
18/06/2019	AM	Raptor & Diver	13:45	17:45	04:00
19/06/2019	AM	Raptor	11:50	14:50	03:00
19/06/2019	SS	Eagle & Raptor	11:55	12:55	01:00
19/06/2019	SS	Eagle & Raptor	14:55	23:55	09:00
20/06/2019	AM	Breeding bird & Diver	12:35	18:45	06:10
20/06/2019	SS	Breeding bird & Diver	13:10	19:20	06:10
21/06/2019	SS	Eagle & Raptor	05:10	08:45	03:35
21/06/2019	SS	Breeding bird	06:15	09:15	03:00
16/07/2019	SS	Breeding bird & Diver	05:20	11:00	05:40
16/07/2019	AM	Breeding bird & Diver	06:30	11:00	04:30
17/07/2019	AM	Raptor & Diver	06:30	10:00	03:30
17/07/2019	AM	Raptor & Diver	13:00	18:00	05:00
17/07/2019	SS	Eagle & Raptor	08:50	15:20	06:30
17/07/2019	SS	Eagle & Raptor	15:40	17:40	02:00
18/07/2019	SS	Diver	04:20	09:30	05:10
18/07/2019	SS	Eagle & Raptor	08:55	12:55	04:00
18/07/2019	SS	Eagle & Raptor	15:55	18:15	02:20
19/07/2019	AM	Breeding bird & Diver	06:30	09:30	03:00
20/08/2019	SS	Raptor & Diver	06:05	07:10	01:05
20/08/2019	SS	Raptor & Diver	13:40	18:45	05:05
20/08/2019	AM	Diver	13:50	19:00	05:10
21/08/2019	AM	Raptor & Diver	14:35	17:35	03:00
21/08/2019	SS	Raptor	15:45	18:30	02:45
22/08/2019	SS	Eagle & Raptor	06:20	12:45	06:25
22/08/2019	AM	Raptor & Diver	13:05	17:05	04:00
17/09/2019	AM	Winter walkover	06:30	07:00	00:30
17/09/2019	AM	Winter walkover	13:35	15:05	01:30
17/09/2019	AM	Winter walkover	18:05	18:35	00:30
17/09/2019	SS	Winter walkover	16:25	19:30	03:05

2.3. Breeding Raptor and Golden Eagle Surveys

Breeding raptor surveys were conducted each month during March to August inclusive 2019 (Table 2.1). Surveys are undertaken in line with SNH guidance and following the species-specific

methodologies outlined in Hardey *et al.* (2013)[3] with golden eagle surveys extending to 6km beyond the site boundary and 2km for all other raptors. The surveyors, Scott Smith and Aidan MacCormick, monitor all areas of potential raptor breeding habitat within the site, plus the species-specific buffers. Surveys are a combination of walkovers and vantage point watches. If there is evidence of territoriality there is a subsequent nest search, under Schedule 1 Licence. Any confirmed nest locations and breeding outcomes will be shared with the Argyll Raptor Study Group (ARSG) and FLS. The G/LAE1B golden eagle range had an occupied nest on 18/04/19 but had failed by 23/05/19. This nest is more than 5km from the site boundary. No active nests have been located for the G/LAE3 golden eagle range at the south west of the site but two potential eyries, close to the site boundary, were unused on 18/04/19.

These surveys will be repeated in 2020.

2.4. Diver Surveys

Eighteen diver surveys were conducted between 17/04/19 and 22/08/19 (Table 2.1). Surveys are undertaken in line with SNH guidance. The surveyors, Scott Smith and Aidan MacCormick, monitor all potential breeding lochans within the site, plus a 2km buffer around the site boundary. Red Throated Divers were observed incubating at three locations and two were successful. A Black Throated Diver was found incubating during May, but there were no signs of any chick(s), during follow up surveys.

These surveys will be repeated in 2020.

2.5. Black Grouse Surveys

Habitat within and surrounding the proposed Eredine wind farm contains areas suitable for breeding and lekking black grouse. Twelve black grouse surveys have been conducted during the 2019 breeding season (Table 2.1) following the methodology described in Gilbert *et al*. (1998)[4]. The first was undertaken on 28/03/19 and subsequent surveys in April and May were undertaken to locate active lek sites. Single males were observed displaying in three locations inside the site boundary. There was unseen lekking recorded approximately 1km north east of the site boundary on 22/05/19. There were four other records of single birds, two inside the site and two outside of the site boundary.

The Black Grouse surveys will be repeated in 2020.

2.6. Vantage Point Surveys

Vantage Points (VPs) surveys are being undertaken for 24 months following SNH guidance (SNH, 2017)[1]. These surveys record flight paths and flight heights and these data will be used to model theoretical collision risk for species of conservation concern. All VP surveys are undertaken by Scott Smith and Aidan MacCormick. VP watches are three hours long with a minimum 30 minute interval

[3] Hardey, J, Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. 2013. Raptors: A Field Guide to Surveying and Monitoring – 3rd Edition. SNH

[4] Gilbert, G., Gibbons, D.W. & Evans, J. 1998. Bird Monitoring Methods. Royal Society for the Protection of Birds, Sandy, UK.

before a surveyor begins a second VP watch. VP surveys are timed to ensure that simultaneous overlap of spatial coverage is not an issue. Flights are recorded in 15 second intervals at three heights: 0 – 30m, 30 – 150m and 150m+.

Two VP surveys (2 x 3 hours) were completed from an initial five locations between April and July 2019. An additional VP was added to start in August 2019. VP6 provides coverage of Beinn Dubh Airigh which is outside of the development area but may have considerable golden eagle activity.

An additional two VPs were added in August 2019 targeted specifically at diver activity (D1 and D2).

VP locations were located (Fig. 2.1) to achieve maximum coverage across the development boundary plus a 500m buffer. Part of the development area was not covered because it was considered that this area was too close to possible G/LAE3 nest sites for development. Initial VP locations were identified using a digital terrain model and field checked to ensure coverage was as expected and there were no impediments to the view sheds. All view sheds assume a 180° view angle with a 2km detection threshold and 1.5m and 30m agl vertical thresholds.

3. Golden Eagle Satellite Tracking Data

EON purchased satellite tracking data for three range holding adult golden eagles (tags 816, 991 and 992) in the vicinity of the Eredine wind farm. To date, tag 816 data covers the period 01/03/17 – 21/07/19, Tag 991 09/02/18 – 22/07/19 and tag 992 25/01/19 – 16/04/19. These data will be updated as the project progresses. Tags 991 and 992 are fitted to both members of the G/LAE3 pair. These are very large data sets, potentially providing location updates every few minutes. Consequently, analyses of these data can provide an extremely robust assessment of golden eagle spatial and temporal use of land around the development site. These data are much more comprehensive than any that can be provided from VP work. Analysis of these data will be undertaken by Dr Alan Fielding who has considerable experience of analysing data from satellite tracked golden eagles.

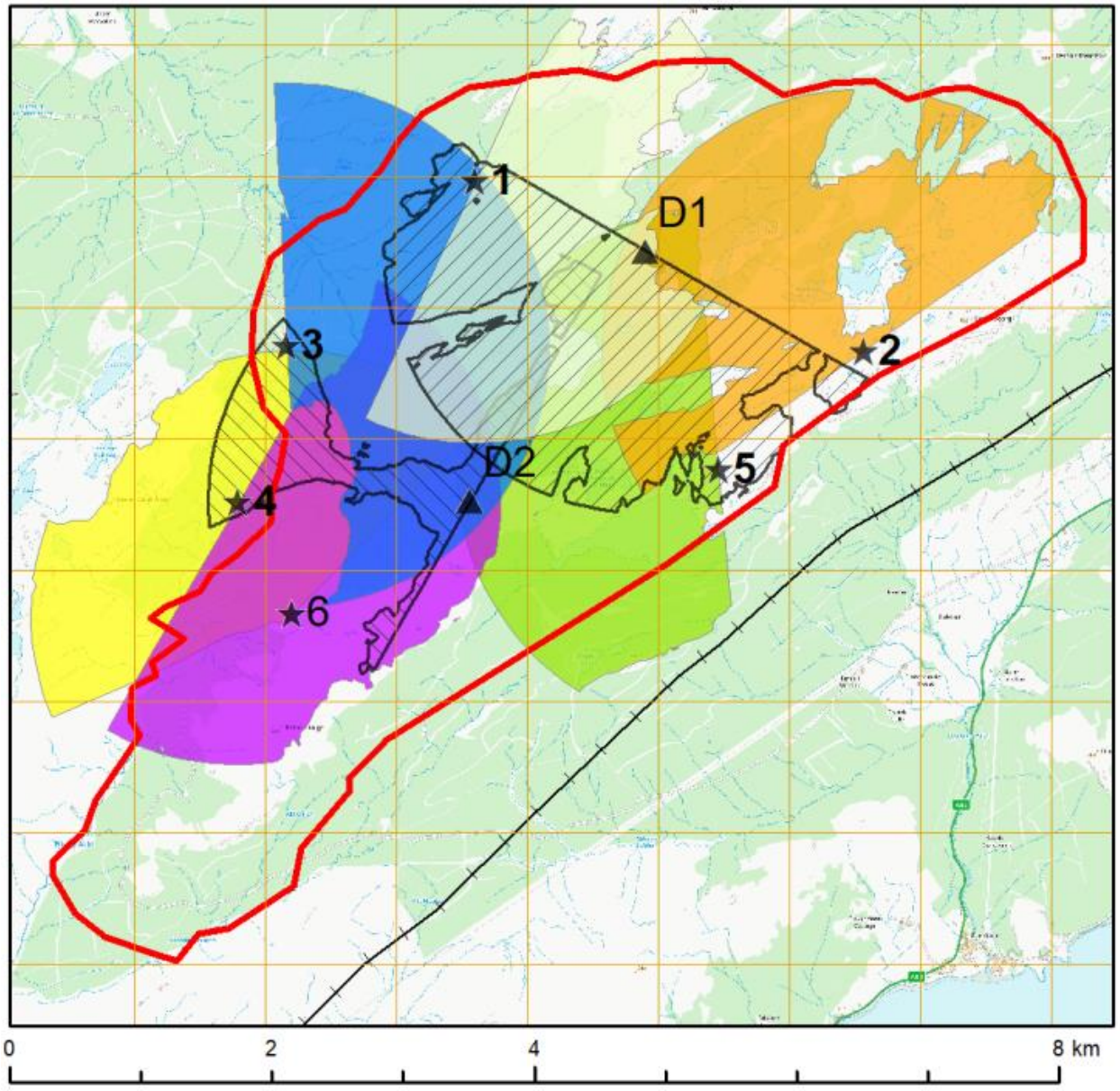

Figure 2.1. Vantage Points and potential view sheds for the Eredine wind farm using a 5m DTM. VP6, D1 & S2 was added for the second part of 2019. The course of the new power line is shown to the SE of the development area. Contains Ordnance Survey data © Crown copyright and database right 2017.

4. Golden Eagle GET Model

Following evidence presented by Dr Phil Whitfield and Dr Alan Fielding at a recent meeting of the Joint Forest and Raptors Working Group (Edinburgh, 02/07/2019) it is certain that the golden eagle PAT model produces unreliable results. Mainly, this is a consequence of the PAT model's range boundary assumptions which have been demonstrated to be potentially grossly inaccurate now that data have been gathered from satellite tagged adult, range holding, birds. Most of the these tagged adults are relatively close to the Eredine wind farm so it is reasonable to conclude that the PAT model should not be used to assess potential range losses at Eredine despite the current SNH guidance. The 816 and 991 ranges were two of the examples in which the PAT range boundaries were a poor guide to the actual

range boundaries. Instead of using the PAT model it is proposed to use data from satellite tagged adult birds close to the Eredine wind farm and the recently published GET Model[5] in combination with the analyses outlined in section 3 to assess potential impacts on these pairs of golden eagles. Using empirical data rather than a model is always preferable and more reliable.

5. Brenchoillie Power Line Works

Work started on October 7th 2019 and will involve track construction, limited felling and some tower construction work. Towers 40-70 are the ones closest to the planned wind farm. The closest tower is more than 1.5km from the nearest proposed turbine location. The route doesn't impact on any of the viewsheds and the closest it gets to the VPs is about 1km (VPs 2 & 5). The schedule for the other towers should not have an impact on the survey work, If there are any issues during planned vantage point watches or other surveys the surveys will be rescheduled.

[5] Fielding, A. H., Haworth, P. F., Anderson, D., Benn, S., Dennis, R., Weston, E. and Whitfield, D. P. 2019. A simple topographical model to predict Golden Eagle Aquila chrysaetos space use during dispersal. Ibis doi: 10.1111/ibi.12718.