
Lochluichart Wind Farm Extension II (LXX)
on behalf of Infinergy Limited
Appendix 12.A - Ornithology



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CONTENTS

1	INTRODUCTION	1
1.1	Background.....	1
2	FIELD SURVEY METHODOLOGY.....	1
2.2	Field Survey Personnel.....	1
2.3	Vantage Point Surveys	2
2.4	Breeding Bird Survey.....	3
2.5	Woodland Grouse Survey	4
2.6	Raptor and Diver Searches.....	4
3	RESULTS	5
3.1	Vantage Point Surveys	5
3.2	Breeding Bird Survey.....	6
3.3	Woodland Grouse Survey	7
3.4	Breeding Raptor & Divers	7
	REFERENCES.....	8
	ANNEX 1 – BIRD SPECIES	9
	ANNEX 2 – SURVEY EFFORT	11
	ANNEX 3 – SURVEY RESULTS.....	18

1 INTRODUCTION

1.1 Background

1.1.1 This report details the results of a desk study and ornithology surveys undertaken for the Lochluichart Wind Farm Extension II (LXX). The following terms are used throughout this report:

- Proposed Development – land encompassing the entire development, as shown on **Figure 12.1**.
- Study Areas – defined as relevant within survey methodologies.

1.1.2 The objectives of the surveys were to:

- Establish an understanding of the bird assemblage and utilisation of the Proposed Development and surrounding area.

1.1.3 Throughout this report only common names of bird species are used. A summary of each species referred to within this report including its common name, species name and conservation status' is presented within **Annex 1**.

2 FIELD SURVEY METHODOLOGY

2.1.1 The following field surveys have been completed:

- Vantage Point surveys April 2015 to March 2016;
- Breeding Birds (April-June 2015);
- Woodland grouse surveys (May 2015); and,
- Raptor / diver searches (May to July 2015).

2.1.2 All surveys have been undertaken in accordance with Scottish Natural Heritage (SNH) guidance *Recommended bird survey methods to inform impact assessment of onshore wind farms* (SNH, 2014).

2.2 Field Survey Personnel

2.2.1 Field surveys have been undertaken by experienced ornithologists, some of which have previously undertaken surveys for the adjacent Corriemoillie Wind Farm and are therefore knowledgeable of the local area. Ornithologists were competent, experienced and professional and fully conversant in recognised bird survey methodologies for proposed wind turbine developments. Surveyors were:

- Mr E. McHugh
- Mr P. Carroll
- Mr R. Jenkins
- Mr M. Wood

2.3 Vantage Point Surveys

- 2.3.1 The VP survey methodology followed current Scottish Natural Heritage guidance *Recommended bird survey methods to inform impact assessment of onshore wind farms* Scottish Natural Heritage (2014), using two VPs (**Figure 12.1**).
- 2.3.2 Two VPs gave a complete visual coverage of the proposed development area turbine locations and provided a full view of the entire ‘rotor swept area’ and the VP study area. The VP study area is defined here, as a 500m buffer around the proposed turbine locations, as illustrated in **Figure 12.1**. The VP locations were chosen to minimise disturbance impacts on breeding birds, notably raptors and grouse.
- 2.3.3 Each VP survey session was up to three hours in duration. The total survey effort completed is summarised in **Table 2.1**.

Table 2.1: VP survey effort.

Month	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
VP1	5.5	15	12	15	6	6	6	0	12	5	6	6
VP2	11.5	12	12	12	6	6	6	6	6	6	6	6

- 2.3.4 Late instruction and poor weather resulted in fewer VP hours being undertaken in April 2015 however these were caught up during followings months surveys.
- 2.3.5 Survey times were dispersed throughout the day, but were generally concentrated on the periods around sunrise and sunset when bird activity is generally at its highest. Surveys were completed in a range of weather conditions. Full details of all survey times and conditions are presented in **Annex 2**.
- 2.3.6 Flight lines were mapped for all target species passing through the VP survey area. Details of species, number of birds, flight height (in bands), duration and direction were noted on standardised recording forms.
- 2.3.7 Any flights recorded within HT2 and also within 200m of the proposed turbine locations would be classified as being within the ‘collision risk window’ and therefore at-risk of colliding with the turbines. SNH (2000) guidance defines the ‘risk window’ as ‘equal to the width of the wind farm across the general flight direction of the birds, and of height equal to the maximum height of the highest turbine’.

Target Species

- 2.3.8 Primarily, target species included those species identified as “Priority” bird species within SNH guidance (2018) and listed on/as:
- Qualifying interests of nearby designated sites for nature conservation;
 - Annex 1 of the European Union Directive 2009/147/EC (the ‘Birds Directive’); and,
 - Schedule 1 of the Wildlife & Countryside Act 1981 (as amended for Scotland).
- 2.3.9 Also with reference to the following documents:

- Scottish Natural Heritage (2013). Survey Methods To Assess The Impacts Of Proposed Onshore Wind Farms On Bird Communities. SNH, Edinburgh;
- Scottish Natural Heritage (2006). Assessing Significance of Impacts from Onshore Windfarms on Birds Outwith Designated Areas. SNH, Edinburgh;
- Scottish Natural Heritage (2013). *Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model*. SNH, Edinburgh;
- Corremoilie Wind Farm ES (2010) and appendices; and,
- Lochluichart Wind Farm Extension ES 2011 and appendices.

2.3.10 Observations of target species beyond the VP study area were recorded along with secondary species below.

2.3.11 Greylag geese in Britain comprises three populations; the Iceland migratory population present between October and April predominantly in Scotland and northern England; the northwest Scotland remnant population which predominantly occur within western Scotland and in mainland northern Scotland; and the re-established (naturalised) introduced population which is widespread throughout Britain and Ireland (Hearn & Mitchell, 2004). For the purposes of baseline field surveys the local wintering population (September to April) was considered to form part of the migratory Icelandic population. Observations of the species outside of October to April were considered part of the re-established (naturalised feral) population.

Secondary Species

2.3.12 Secondary species were recorded in 15 minute summary intervals, noting the number of birds present and general behaviour in order to build an overall picture of activity. Fifteen minute periods were considered appropriate to ensure the surveyor was fully alert to target species activity.

2.3.13 Secondary species were defined as commoner raptors, all gulls (excluding Mediterranean gull), mute swan, mallard and feral species, along with any large concentrations of commoner passerines.

2.4 Breeding Bird Survey

2.4.1 A Breeding Bird Survey (BBS) was undertaken in the spring and early summer of 2015. The methodology employed was based-upon SNH (2014) guidance version of the British Trust for Ornithology (BTO) Common Bird Census (CBC) technique, as detailed in Gilbert *et al.* (1998). This involved walking the survey area and recording all species and behaviours indicative of breeding, in order to enable an estimation of the number of breeding bird territories present.

2.4.2 The BBS survey area is defined here as all land within the Proposed Development extended to include all areas within approximately 500m of the Proposed Development, as access allowed. An overview of the survey area is provided in **Figure 12.3**.

2.4.3 During each survey visit a pre-determined route was walked through the survey area and all birds seen or heard, and their behaviours (e.g. singing, carrying food etc.) were mapped in the field. The survey in May was completed over two days due to poor weather.

2.4.4 All surveys were undertaken during daylight hours and in fine conditions (dry, warm, light breeze and no rain). Survey effort is presented in **Table 2.3**. Detailed survey effort including survey conditions are presented in **Annex 2**.

Table 2.3: Breeding bird survey effort.

Date	Start Time	End Time	Notes
29/04/15	09.00	12.30	Two surveyors. A small portion of the western buffer was not surveyed due to change in weather conditions creating very poor visibility.
20/05/16	08.15	14.15	Survey completed by one surveyor over two days.
21/05/16	08.40	14.30	
10/06/15	09.20	15.20	Completed by two surveyors with a break in between of 2 hours.
23/06/15	11.30	18.00	Survey completed by one surveyor over two days.
24/06/15	08.00	12.45	

2.5 Woodland Grouse Survey

2.5.1 A search for evidence of breeding woodland grouse was undertaken on 8th May 2015 between 05:30am and 07:30am. This involved a search of all suitable habitats within the 1.5km buffer of the proposed turbines and where access allowed with reference to methodology outline by Gilbert *et al.* (1998). An overview of the survey area is provided in **Figure 12.4**.

2.6 Raptor and Diver Searches

2.6.1 Searches for breeding raptors and divers were undertaken between May and July 2015 with reference to methodologies outlined by SNH (2014). An overview of the survey area is provided in **Figure 12.5**.

2.6.2 These surveys were conducted by walking/driving areas up to approximately a 2km radius from the Site and completing a series of scaled-down VP watches to search for breeding raptors and divers, although effort was concentrated on habitats where notable species may be present.

2.6.3 All surveys were undertaken during daylight hours and in fine conditions (dry, warm, light breeze and no rain). Survey effort is presented in **Table 2.4**. Survey conditions are presented in **Annex 2**.

Table 2.4: Raptor and Diver survey effort.

Date	Start Time	End Time
11/05/15	11.30	17.30
09/06/15	12.00	18.00
22/07/15	09.40	16.00

3 RESULTS

3.1 Vantage Point Surveys

Target Species

- 3.1.1 All target species flight activity recorded during VP surveys between April 2015 and March 2016 is summarised in **Table 3.1** below. The total number of flights, total number of birds recorded and the total time spent in each height band (in seconds) are presented.
- 3.1.2 Detailed flight records for target species are presented in **Annex 3**, with flight lines illustrated in **Figure 12.2**.

Table 3.1: Summary of target species flight activity.

Species	Total No. of Flights	Total No. of Birds	HT1 (s)	Collision Risk Height	
				HT2 (s)	HT3 (s)
Golden eagle	3	3	12	195	45
Greylag goose	2	502	0	91	0
Golden plover	8	11	62	458	0
Merlin	1	1	0	25	15
Osprey	2	2	0	375	208
Hen harrier	1	1	0	157	60
Red kite	1	1	0	84	0

- 3.1.3 Additional observations include golden plover which were heard during four VP sessions in May and June 2015 but no birds were seen. A sub adult golden eagle was observed during on 15/10/15 heading south over VP1 as the surveyor was leaving site and a merlin was observed flying over the site from the west while the surveyor was walking to the VP.

3.2 Breeding Bird Survey

- 3.2.1 A breeding bird survey was completed between April and June 2015. All species recorded along with an estimate of the number of pairs present within the survey area are detailed in **Table 3.5**.
- 3.2.2 In summary the survey area supports a breeding assemblage typical of farmland and woodland habitats including some wader observations including golden plover and greenshank.

Table 3.5: BBS results 2015.

Species	Estimated Population (Maximum No. Pairs)
Buzzard	2
Chaffinch	4
Cuckoo	1
Coal tit	4
Goldcrest	1
Greenshank	2
Grey wagtail	1
Golden plover	2
Hooded crow	2
House martin	1
Little grebe	1
Lesser redpoll	1
Mallard	2
Meadow pipit	98 (approximate)
Pied wagtail	3
Robin	4
Red grouse	4 (1 confirmed nest with 10 eggs seen)
Raven	1
Skylark	13
Stonechat	1
Spotted flycatcher	4
Snipe	2
Wheatear	2
Wren	2
Willow warbler	21

3.3 Woodland Grouse Survey

- 3.3.1 Searches of all suitable habitats within at least 1.5km of the proposed turbines recorded a single active black grouse lek comprising two males at the following approximate grid reference during the specific grouse survey on 8th May 2015 but also on 24th April during a BBS: NH3339269319. A single male was recorded in this location on 23rd June 2015.
- 3.3.2 A further single male was observed outside the Proposed Development to the north at NH 34653 70528 within the plantation to the east of Loch Glasdarnoch.
- 3.3.3 No further observations of woodland grouse were made during the baseline field surveys.

3.4 Breeding Raptor & Divers

- 3.4.1 Four searches for breeding raptors and divers were undertaken between May and July 2015.
- 3.4.2 No raptors were observed during the May visits with the exception of a single buzzard flight north east of Loch Glasdarnoch. June recorded more species although activity was consistently low; a single golden eagle flight south east of Corriemoillie Forest, an osprey heading north west over Loch Glasdarnoch, two merlin over Corriemoillie Forest and a red kite heading north over Meall nan Caorach. A second osprey was observed flying south from Sidhean nan Cearc in July 2015.
- 3.4.3 No evidence of breeding was recorded. Flights are presented on **Figure 12.5**.

REFERENCES

Eaton, M.A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R., Aebischer, N.J., Gibbons, D.W., Evans, A. and Gregory, R.D. (2009) *Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man*. *British Birds*, **102**, pp. 296-341.

Gilbert, G., Gibbons, D.W. and Evans, J. (1998) *Bird Monitoring Methods*. RSPB, Sandy.

Hearn and Mitchell (2004) Greylag goose *Anser anser* (Iceland population) in Britain and Ireland 1960/61 0 1999/2000. *Waterbird Review Series*, WWT/JNCC, Slimbridge.

Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland. Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge. 108pp.

Natural England (2010) Technical Information Note TIN069: *Assessing the effects of onshore wind farms on birds*. Natural England, Peterborough.

Scottish Natural Heritage (2000) Windfarms and Birds: Calculating a Theoretical Collision Risk Assuming No Avoiding Action. *Guidance Note Series*. Scottish Natural Heritage, Edinburgh.

ANNEX 1 – BIRD SPECIES

Table A.1 provides a summary of all bird species referred to within the Appendix including common names, species names and current conservation status.

The following abbreviations are used to describe each species conservation status:

- Annex 1: species listed on Annex 1 of the EC Birds Directive.
- S1: species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).
- S41: species listed on Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
- UKBAP: species listed on the UK Biodiversity Action Plan.
- LBAP: Ross and Cromarty (East) LBAP.
- SBL: Scottish Biodiversity List (SBL) 2013
- BoCC: Birds of Conservation Concern 4 (Eaton *et al.*, 2009). Red or Amber list categories are given.

Table A2.1: Summary of bird species referred to within this Appendix.

Common Name	Species Name	Conservation Status
Great crested grebe	<i>Podiceps cristatus</i>	-
Grey heron	<i>Ardea cinerea</i>	-
Mute swan	<i>Cygnus olor</i>	-
Pink-footed goose	<i>Anser brachyrhynchus</i>	BoCC - Amber
Canada goose	<i>Branta canadensis</i>	-
Shelduck	<i>Tadorna tadorna</i>	BoCC - Amber
Teal	<i>Anas crecca</i>	BoCC - Amber
Mallard	<i>Anas platyrhynchos</i>	BoCC - Amber
Shoveler	<i>Anas clypeata</i>	BoCC - Amber
Pochard	<i>Aythya ferina</i>	BoCC - Amber
Tufted duck	<i>Aythya fuligula</i>	BoCC - Amber
Goldeneye	<i>Bucephala clangula</i>	S1 (II)
Black grouse	<i>Tetrao tetrix</i>	SBL, LBAP, BoCC - Red
Sparrowhawk	<i>Accipiter nisus</i>	-
Buzzard	<i>Buteo buteo</i>	-
Kestrel	<i>Falco tinnunculus</i>	BoCC - Amber
Golden eagle	<i>Aquila chrysaetos</i>	Annex 1, S1, SBL, LBAP, BoCC–Amber.
Osprey	<i>Pandion haliaetus</i>	Annex 1, S1, LBAP, BoCC- Amber
Red kite	<i>Milvus milvus</i>	Annex 1, S1, BoCC - Amber

Common Name	Species Name	Conservation Status
Peregrine	<i>Falco peregrinus</i>	Annex 1, S1
Hen harrier	<i>Circus cyaneus</i>	Annex 1, S1, BoCC – Red, SBL, LBAP
Merlin	<i>Falco columbarius</i>	Annex 1, S1, BoCC-Amber, SBL
Pheasant	<i>Phasianus colchicus</i>	-
Coot	<i>Fulica atra</i>	-
Oystercatcher	<i>Haematopus ostralegus</i>	BoCC - Amber
Ringed plover	<i>Charadrius hiaticula</i>	BoCC - Amber
Lapwing	<i>Vanellus vanellus</i>	S41, UKBAP, BoCC - Red
Greenshank	<i>Tringa nebularia</i>	S1, BoCC-Amber
Jack snipe	<i>Lymnocyptes minimus</i>	BoCC - Amber
Snipe	<i>Gallinago gallinago</i>	BoCC - Amber
Red throated diver	<i>Gavia stellata</i>	Annex 1, S1, BoCC - Amber
Black-headed gull	<i>Chroicocephalus ridibundus</i>	BoCC - Amber
Common gull	<i>Larus canus</i>	BoCC - Amber
Herring / lesser black-backed gull	<i>Larus argentatus / L. fuscus</i>	BoCC - Amber
Herring gull	<i>Larus argentatus</i>	S41, UKBAP, BoCC - Red
Woodpigeon	<i>Columba palumbus</i>	-
Skylark	<i>Alauda arvensis</i>	S41, UKBAP, BoCC - Red
Pied wagtail	<i>Motacilla alba</i>	-
Wren	<i>Troglodytes troglodytes</i>	-
Robin	<i>Erithacus rubecula</i>	-
Blackbird	<i>Turdus merula</i>	-
Song thrush	<i>Turdus philomelos</i>	S41, UKBAP, BoCC - Red
Sedge warbler	<i>Acrocephalus schoenobaenus</i>	-
Whitethroat	<i>Sylvia communis</i>	BoCC - Amber
Blackcap	<i>Sylvia atricapilla</i>	-
Chiffchaff	<i>Phylloscopus collybita</i>	-
Willow warbler	<i>Phylloscopus trochilus</i>	BoCC - Amber
Blue tit	<i>Cyanistes caeruleus</i>	-
Great tit	<i>Parus major</i>	-
Starling	<i>Sturnus vulgaris</i>	S41, UKBAP, BoCC - Red
Tree sparrow	<i>Passer montanus</i>	S41, UKBAP, BoCC - Red
Chaffinch	<i>Fringilla coelebs</i>	-
Goldfinch	<i>Carduelis carduelis</i>	-

ANNEX 2 – SURVEY EFFORT

Tables A2.1-3 presents field survey efforts.

The following codes are used to record weather conditions within Tables A2.1-3:

Wind Speed		Wind Direction		Cloud Height	
Calm	0	16 point compass		<150m	0
Light air	1	Variable	?	150-500m	1
Light breeze	2			>500m	2
Gentle breeze	3	Rain			
Moderate breeze	4	None	0		
Fresh breeze	5	Drizzle/mist	1		
Strong breeze	6	Light showers	2		
Moderate gale	7	Heavy showers	3		
Fresh gale	8	Heavy rain	4		
Strong gale	9				
Whole gale	10	Visibility			
Storm	11	Poor	0		
		<1km	1		
		>1km	2		

Table A2.1:VP survey effort.

Date	VP	Surveyor	Start Time	Finish Time	VP Hours	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Frost	Snow	Notes
27/04/2015	2	PC	15.45	18.15	2.7	3/2/2	S/SW/SW	2/0/4	7/6/6	2	2	0	2	Sleet showers and variable visibility/cloud height. Survey abandoned due to onset of blizzard.
27/04/2015	1	EM	15.46	18.16	2.7	2	SW	0	8/6/8	1	1/2/1	0	1	

Date	VP	Surveyor	Start Time	Finish Time	VP Hours	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Frost	Snow	Notes
28/04/2015	1	PC	14.15	17.15	3	3	SW/W/W	2	7/8/8	2/2/1	2/2/1	0	2	
28/04/2015	2	PC	18.00	21.00	3	3	SW	2/2/0	7/6/5	2	2	0	2	
30/04/2015	2	EM	13.50	16.50	3	3	N/NNW/NW	2/0/0	5/4/3	2	2	0	2	
30/04/2015	2	EM	17.20	20.20	3	3	NW	0	2/2/1	2	2	0	2	10 minute hail shower during first hour.
01/05/2015	1	EM	07.45	10.45	3	2	N	0	3/5/5	2	2	1/1/0	2	
07/05/2015	1	MW	09.00	12.00	3	3	NW	0/2/2	6/7/6	2	2	0	1	
07/05/2015	1	MW	12.30	15.30	3	3	NW	0	6/5/5	1/1/2	2	0	1	
08/05/2015	2	MW	07.30	10.30	3	3	NW	0	0/0/1	2	2	0	0	
08/05/2015	2	MW	11.00	14.00	3	3	NW	0	1	2	2	0	0	
28/05/2015	1	EM	09.15	12.15	3	3/3/0	SW	2	7/7/6	2	2	0	0	Disturbance from repair works to turbine nearest to Vantage Point.
28/05/2015	1	EM	12.45	15.45	3	3	SW/SSW/SW	2	6	1/2/1	1/2/1	0	0	
29/05/2015	2	EM	07.45	10.45	3	3/2/3	W	2/0/0	7/6/6	2	2	0	0	GP in the vicinity of the Vantage Point, present during 3 hours.
29/05/2015	2	EM	11.15	14.15	3	3	W	2/0/0	6/6/5	2	2	0	0	
22/06/2015	1	EM	13.45	16.45	3	3	N/N/NNE	1/0/0	8	2	2	0	0	GP heard South of

Date	VP	Surveyor	Start Time	Finish Time	VP Hours	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Frost	Snow	Notes
														Vantage Point, but no flights recorded.
22/06/2015	1	EM	17.15	20.15	3	3	NNE	0	8/8/7	2	2	0	0	GP heard but not seen.
23/06/2015	2	EM	08.00	11.00	3	1	NE/ENE/ENE	0	8	2	2	0	0	
24/06/2015	2	EM	13.30	16.30	3	2/1/1	SSE	1/2/2	8	1	2/1/1	0	0	
25/06/2015	2	RJ	10.30	13.30	3	2	SSW/S/S	0	6/7/8	2	2	0		
25/06/2015	1	EM	10.45	13.45	3	1/2/2	SE	0	6/7/8	1/2/2	2	0	0	
25/06/2015	2	RJ	14.00	17.00	3	2	S	0/0/1	8	2	2	0	0	
25/06/2015	1	EM	14.15	17.15	3	2	SE/ESE/ESE	0/0/2	8	2/2/1	2/2/1	0	0	
20/07/2015	1	EM	15.35	18.35	3	3	E/ESE/SE	0	8/8/7	2	2	0	0	Usual vehicle traffic, also people putting up a fence near Loch a Mheallain Chaorainn, they left at 17.00.
20/07/2015	1	EM	19.05	22.05	3	2/1/1	SE/SE/SSE	2	8	2/1/1	2/2/1	0	0	
21/07/2015	2	EM	11.00	14.00	3	4/4/5	W/W/WSW	2/0/0	7/6/7	1/2/2	2	0	0	
21/07/2015	2	EM	14.30	17.30	3	5/4/4	WSW	2/0/0	8	2	2			GP heard but not seen.
23/07/2015	1	MW	17.35	20.35	3	3	W	0/2/0	5/6/6	2	2	0	0	
25/07/2015	1	EM	06.00	09.00	3	3/3/2	W	2/2/0	8	2	2	0	0	ML seen walking to Vantage Point, flew

Date	VP	Surveyor	Start Time	Finish Time	VP Hours	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Frost	Snow	Notes
														from Vantage Point West but not seen again.
25/07/2015	1	EM	09.30	12.30	3	2/3/3	W	0	8	2	2	0	0	
26/07/2015	2	EM	07.20	10.20	3	1/2/2	E/E/ESE	0	5/7/7	2	2	0	0	
26/07/2015	2	EM	10.50	13.50	3	2/3/3	SE/SE/E	0	7	2	1	0	0	
17/08/2015	1	RJ	15.15	18.15	3	1	SE	0	4/5/5	2	2	0	0	
17/08/2015	2	RJ	18.45	21.45	3	1/0/0	SE/-/-	0	4/5/6	2	2	0	0	
18/08/2015	1	RJ	16.00	19.00	3	1	NW	0/1/0	8	2	2	0	0	
18/08/2015	2	RJ	12.30	15.30	3	1	NW	0	6/8/8	2	2	0	0	
02/09/2015	1	EM	14.00	17.00	3	4	WNW/WNW/NW	1	8	2/1/1	2	0	0	
02/09/2015	1	EM	17.30	20.30	3	4	NW	1	8/7/8	1	2	0	0	
16/09/2015	1	RJ	13.15	16.15	3	1/0/1	SW/-/SW	0	6/5/7	2	2	0	0	
16/09/2015	1	RJ	16.45	19.45	3	0/0/1	-/-/SW	0/0/1	6/7/6	2	2	0	0	
01/09/2015	2	EM	06.00	09.00	3	3	W	0/0/2	8	2/1/1	2	0	0	
03/09/2015	2	EM	10.40	13.40	3	4	NW	2/1/1	8/7/7	1	2	0	0	
17/09/2015	2	RJ	07.00	10.00	3	1/0/0	W/-/-	0/0/1	8/7/7	2	2	0	0	
17/09/2015	2	RJ	10.30	13.30	3	1/0/1	W/-/W	2/1/1	6/7/7	2	2	0	0	

Date	VP	Surveyor	Start Time	Finish Time	VP Hours	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Frost	Snow	Notes
15/10/2015	1	RJ	07.30	10.30	3	1	SW	0	4/4/2	2	2	0	0	
15/10/2015	1	RJ	11.00	14.00	3	1	SW	0	3/4/5	2	2	0	0	Sub adult EA seen whilst leaving site, came from North and circled above Vantage Point 2, then headed back North East.
21/10/2015	2	RJ	09.00	12.00	3	5	SW	0/1/1	7/8/8	1	1	0	0	
21/10/2015	2	RJ	12.30	15.30	3	5	SW	1/0/1	8	1	1	0	0	
25/11/2015	2	GR	09.15	12.15	3	3	WNW/WNW/NW	2/0/2	8/8/7	2	2	0	0	
25/11/2015	2	GR	12.45	15.45	3	3	NW/NW/WNW	0/1/0	7/6/6	2	2	0	0	
02/12/2015	1	GR	09.30	12.30	3	4	W	1/0/0	7/5/3	2	1/2/2	0	0	
02/12/2015	1	GR	13.00	16.00	3	4	W	0	3/4/3	2	2	0	0	
23/12/2015	1	GR	09.05	12.05	3	4	SW	3/2/3	7/6/6	2/1/1	2	0	2	
23/12/2015	1	GR	12.35	15.35	3	4	SW	2/0/2	5/6/6	1	2	0	2	
17/12/2015	2	GR	08.55	11.55	3	4	W	3/1/0	8/8/7	1/1/2	2	0	0	
17/12/2015	2	GR	12.25	15.25	3	3	W	0/2/0	6/5/5	2	2	0	0	
27/01/2016	1	RJ	08.45	11.45	3	2	NW	0	7/7/6	2	2	0	0	
27/01/2016	1	RJ	12.15	14.15	2	2/3	NW	0	6/8	2	2/1	0	0/1	Survey abandoned due to blizzard.

Date	VP	Surveyor	Start Time	Finish Time	VP Hours	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Frost	Snow	Notes
26/01/2016	2	RJ	09.45	12.45	3	2/4/5	WNW	2/1/2	8/7/7	1/2/1	2	0	0	
26/01/2016	2	RJ	13.15	16.15	3	5	WNW	0/1/3	8/8/7	2	2/2/1	0	0	
24/02/2016	1	GR	09.10	12.10	3	2	N/N/NNW	0/2/0	3/6/4	2	2	2	1	
24/02/2016	1	GR	12.40	15.40	3	2	NNW/NNW/NW	1/0/2	4/7/7	2	2	2	1	
25/02/2016	2	GR	08.50	11.50	3	1	NW	1/0/0	8	1/1/2	2	2	1	
25/02/2016	2	GR	12.20	15.20	3	1	NW	0	8/6/6	2	2	2	1	
16/03/2016	2	RJ	12.15	15.15	3	1	SE	0	8/1/0	1/2/2	1/2/2	0	0	
16/03/2016	2	RJ	15.45	18.45	3	1	SE	0	0/1/1	2	2	0	0	
17/03/2016	1	RJ	06.40	09.40	3	1/2/1	WNW	0	0	2	2	0	0	
17/03/2016	1	RJ	10.10	13.10	3	1/2/2	WNW	0	0	2	2	0	0	

Table A2.2: BBS survey effort.

Date	Surveyor	Start Time	Finish Time	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Frost	Snow
29/04/2015	PC	09.00	12.30	2	NW/NE	1/0/1/3	8	1/2/1	2	0	2
20/05/2015	PC	08.15	14.15	3	NW/WNW	0	7/6	2	2	0	0
21/05/2015	PC	08.40	14.30	3	SW	1/2/0	8	2	2	0	0

10/06/2015	RJ	11.00	14.30	2/1/2	NW/W	0	6/5/4	2	2	0	0
10/06/2015	EM	09.20	15.20	2/3/2	NW/WNW	0	5/4/3	2	2	0	0
23/06/2015	EM	11.30	18.00	1	ENE	0	8	2	2	0	0

Table A2.3: Raptor and Diver survey Effort

Date	Surveyor	Start Time	Finish Time	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Frost	Snow	Notes
11/05/2015	EM	11.30	17.30	5/4/5	SW	2/0	7/8/6/5	2	2	0	2	
09/06/2015	RJ	12.00	18.00	3/2	W	0	7/6	2	2	0	0	work on turbine causing some disturbance
22/07/2015	EM	09.40	16.00	3	SW/S	1/2/1/0	8/7/6	2	2	0	0	

ANNEX 3 – SURVEY RESULTS

Table A3.1:VP survey results.

Date	VP	Species	No.	Start Time	Total Duration (s)	HT1 (s)	HT2 (s)	HT3 (s)
01/05/2015	1	EA	1	08.51	45	0	0	45
07/05/2015	1	GP	1	10.32	55	0	55	0
08/05/2015	2	GP	1	08.21	55	0	55	0
08/05/2015	2	GJ	500	08.24	45	0	45	0
25/06/2015	2	GJ	2	11.22	46	0	46	0
25/06/2015	2	OP	1	12.40	193	0	105	88
25/06/2015	2	OP	1	12.40	390	0	270	120
25/06/2015	2	GP	3	12.49	17	17	0	0
25/06/2015	2	GP	1	13.09	15	15	0	0
25/06/2015	1	GP	2	10.56	30	30	0	0
25/06/2015	1	ML	1	15.58	40	0	40	15
23/07/2015	1	GP	1	19.36	65	0	65	0
18/08/2015	2	EA	1	12.30	190	0	195	0
18/08/2015	2	EA	1	12.30	12	12	0	0
15/10/2015	1	HH	1	10.17	215	0	217	60
23/12/2015	1	KT	1	14.04	80	0	84	0
17/03/2016	1	GP	1	09.09	472	0	172	0
17/03/2016	1	GP	1	11.00	111	0	111	0