

ANNEX D – ATMOS: MOORSHIELD BIRD SURVEY REPORT

Report

Moorshield Wind Farm

Breeding Season Ornithology Surveys

Wind 2 Ltd

September 2019



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1 Introduction and background

1.1 Terms of reference

This report presents the findings of the ornithology surveys carried out in support of the proposed Moorshield Wind Farm (the proposed development) in East Renfrewshire. The survey work and production of this report have been carried out by Atmos Consultancy Ltd on behalf of Wind2.

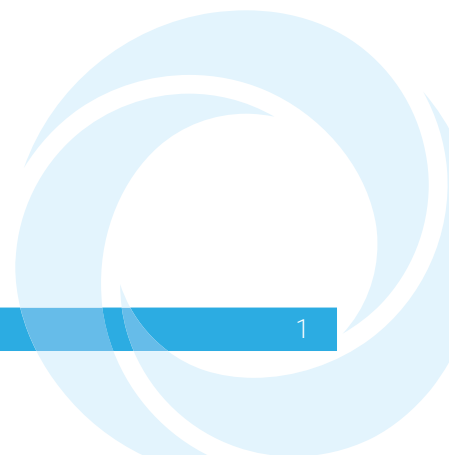
Ornithology survey work commenced in March 2019 and was completed in August 2019.

1.2 Site Description

The proposed development is located at a site (approximate grid reference NS 519493) approximately 5 km south west of Eaglesham, East Renfrewshire and 10 km north east of Stewarton, East Ayrshire and would consist of three wind turbines with a tip height of up to 149.9 m plus associated infrastructure including turbine foundations, crane hardstandings, onsite access tracks, working areas and substations. As the proposed development is considered a small scale windfarm under SNH guidance (SNH, 2017), the full set of 2017 bird surveys are not necessarily required for the site. Given the location of the proposed site and the absence of any designated sites in close proximity, it was decided that the breeding season surveys would be sufficient to allow the baseline to be described as this represented the time when sensitive species were most likely to be present. It was decided these would commence during the spring migration period so that the surveys would cover the period when the most sensitive bird species were likely to be present on site.

1.3 Objectives

The aims of this report are to describe the methodology used for surveys of the proposed development and the data gathered as a result of those surveys.



2 Methodology

2.1 Vantage Point Surveys

The site is covered by one vantage point (VPs). Vantage point surveys commenced in March 2019 and have been carried out at 6 hours per month between March 2019 and August 2019 (Table 1).

The VP used (Figure 1) was located at:

- VP1 252346 649616 (255°)

On the April visit, it was necessary to use a slightly different VP (252149, 648904). However the viewshed of this location was similar to the viewshed of VP1; as a result, the two have been treated as essentially being the same.

Table 1: Hours of VP observation

Date	VP Hours
30/03/2019	6
28/04/2019	6
25/05/2019	6
22/06/2019	6
20/07/2019	6
25/08/2019	6

Standard VP methodology has been used as per SNH guidance (SNH, 2017). Target species are non-passerine Schedule 1 and Annex 1 species, wildfowl (with the exception of Mallard *Anas platyrhynchos* and Little grebe *Tachybaptus rufficollis*) and sensitive waders such as Curlew *Numenius arquata*.

Height bands used during surveys were as shown below:

- A – 0-<20 m
- B – 20 – 150 m
- C - > 150 m

Band B is therefore considered to be at collision risk height.

Dates and times and the weather recorded during all VPs are shown in Appendix A.

2.1.1 Limitations

The use of a slightly different VP location for the April VP is not considered to create a limitation on the data due to the fact it had a similar viewshed to that of VP1.

2.2 Breeding Bird Surveys

Table 2 shows the dates and times of breeding bird surveys, which were carried out using a modified Brown and Sheperd methodology, amended as outlined in in (SNH, 2017).

Surveys were carried out at approximately monthly intervals between May and July, with the survey area focussing on an area within 1km of the turbines. The survey area is shown on Figure 2.

Additionally, a raptor survey was carried out to 2 km from the turbines; this was carried out on the same day as the breeding bird survey. Because of limited access off site, it was restricted to publicly accessible areas using the local public road network, excluding the M77 for health and safety reasons. All birds seen or heard during the survey (and raptors and species sensitive to wind farms in the raptor survey area) were recorded using BTO codes on dedicated survey maps. The survey areas are shown on Figure 2.

Table 2: Dates and times of breeding bird surveys

Date	Visit	Start Time	Length (hrs)	Surveyor
12/05/2019	1	08:30 – 17:20	8 hrs 50 mins	Tim Drew
26/05/2019	2	08:35 – 17:10	8hrs 35 mins	Tim Drew
14/06/2019	3	08:35 – 15:25	6 hrs 50 mins	Tim Drew
08/07/2019	4	08:40 – 16:00	7 hrs 20 mins	Tim Drew

The behaviour and location of each species were recorded on 1:10,000 scale maps, using standard BTO codes and nomenclature.

Once surveys were complete, analysis of territories was undertaken. This involved the assessment of bird records across all four survey areas. Four categories were recognised:

- Confirmed territory – nest was found or adults seen carrying food (unless observed bird was a raptor species) or nesting material. Presence of juvenile birds on the site;
- Probable territory – bird(s) were seen in the same location on more than one occasion, but where breeding behaviour was observed on at least one occasion (e.g. courtship, display or singing, pairs in suitable habitat, territorial disputes);
- Possible territory – birds observed only once in one location, but evidence of breeding was observed; birds recorded repeatedly (i.e. across several visits) in suitable habitat but no evidence of breeding was observed; and
- Non-breeding – bird was observed with no breeding behaviour observed and on no other visit was a bird observed in the same location.

2.2.1 Limitations

While the raptor survey was surveying an area up to 2km from the turbine locations, access to the full survey area could not be achieved due to access limitations and health and safety reasons, as the M77 covered part of the survey area. Of necessity it was therefore in much less detail than would normally be required under SNH guidance.

However, given the scale of the development, the habitats present and the location of the wind farm, where Schedule 1 breeding raptor species were considered unlikely to occur, it was felt this was suitable for the purpose and allowed opportunity to identify any sensitive species breeding in the area 1 – 2 km from the wind farm.

The first breeding bird survey was carried out in May; this was later than guidance suggests, which means some territories which may have commenced early and failed may have been missed. However, the greater frequency in May would also assist in confirming territory presence.

3 Results

3.1 Vantage Point Surveys

Table 3 shows the summary results of the vantage point surveys between March 2019 and August 2019. Seven species in total were recorded during the VP surveys. Flightlines for all species except Mallard *Anas platyrhynchos* and Oystercatcher *Haematopus ostralegus* are shown in Figure 3. Appendix B includes the flight line information for all target species observed.

Table 3: VP results

Species	Scientific Name	Conservation Designation ¹	Min No. of Birds	Max No. of Birds	Mean No. of Birds	No. of Flights	Total Bird Seconds	At Risk Bird Seconds
Cormorant	Phalacrocorax carbo		1	1	1	4	348	297
Curlew	Numenius arquata	UK BAP SBL	1	4	1.30	23	2,899	1,220
Lapwing	Vanellus vanellus	UK BAP SBL	1	4	2.27	11	2,528	520
Mallard	Anas platyrhynchos		2	2	2	1	228	228
Oystercatcher	Haematopus ostralegus		3	5	4	2	297	0
Peregrine	Falco peregrinus	Annex 1 Schedule 1 SBL	1	1	1	1	196	196
Teal	Anas crecca		3	3	3	1	114	0

¹ – Annex 1 – listed on Annex 1 of the Birds Directive;
Schedule 1 – listed on Schedule 1 of the Wildlife and Countryside Act (1981) as amended;
SBL – Listed on Scottish Biodiversity List;
Amber/Red – categorised as amber or red on Birds of Conservation Concern.

Curlew were the most commonly observed target species with 23 flights in total observed for this species. Lapwing was the second most commonly observed target species with 11 flights recorded for the species. Both of these species were breeding within the viewshed and flights were generally associated with territories, although it appears some feeding movements for Curlew in the wider area were also recorded.

The rest of the other species were relatively uncommon with only a handful or singular records being recorded.

The single Peregrine record was recorded towards the end of the breeding season.

3.2 Breeding Bird Surveys

Table 4 shows the results of the breeding bird surveys. These are shown on Figure 4. In total 54 different species were recorded over the four breeding bird surveys. Skylark *Alauda arvensis* was the most commonly recorded species with 79 records (46 probable territories and 24 possible territories with 9 non-breeding records). Raven *Corvus corax* and Carrion crow *Corvus corone* were the next commonly recorded species with 15 and 14 non-breeding records respectively.

Only three territories (Mallard, Common gull *Larus canus* and Swallow *Hirundo rustica*) were recorded as confirmed breeding territories. A pair of Mallard were recorded in both of the May surveys on Bennan Loch, with a female with 6 young birds present on the same loch in the July survey. A pair of Common gull were recorded on Bennan Loch in both May surveys with a nest being located during the June survey. The nest was found to be empty during the July survey. A swallow nest was recorded on two different surveys in May, by the Shieldhill farm buildings.

In total 64 records were recorded as probable territories and 58 as possible territories. Other notable species recorded breeding included 8 Curlew territories, 7 Lapwing territories, and 3 Snipe territories. There is evidence that both Curlew and Snipe are displaced by wind turbines; five Curlew territories and two Snipe territories lay within 500 m of turbines.

A number of birds of prey were recorded during the surveys. Of most note was sighting of two juvenile Merlin *Falco columbarius* and an adult male on the July visit, suggesting that breeding had occurred in the vicinity of the sighting. This was within the 1 km buffer around the wind farm, and closer to Whitelee Wind Farm.

Multiple Buzzards *Buteo buteo* were seen during the surveys with three possible territories in different areas of forestry being recorded, one in the north of the site, one to the west and the final one in the southwest, as Buzzards were repeatedly seen in these locations but with no other evidence of breeding observed. Two possible Kestrel *Falco tinnunculus* territories were identified. A single male was observed once and a female observed on two different occasions around the area of the Shieldhill farm buildings, which would also provide suitable nesting habitat, but no nest was located. The other two territories lay in the 1 km buffer area.

Table 4: Breeding Bird Survey results

Species	Scientific Name	Conservation Designation?	Confirmed	Probable	Possible	Non-breeding	Grand Total
Black-headed gull	<i>Chroicocephalus ridibundus</i>	SBL				1	1
Buzzard	<i>Buteo buteo</i>				3	7	10
Canada goose	<i>Branta canadensis</i>				1	3	4
Carrion	<i>Corvus corone</i>					14	14

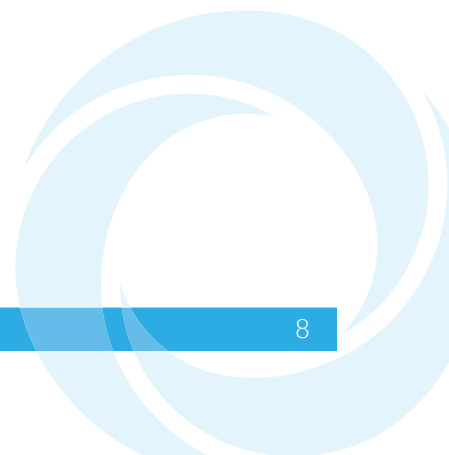
Species	Scientific Name	Conservation Designation ²	Confirmed	Probable	Possible	Non-breeding	Grand Total
crow							
Chaffinch	<i>Fringilla coelebs</i>			5	2		7
Chiffchaff	<i>Phylloscopus collybita</i>				1		1
Coal tit	<i>Parus ater</i>					3	3
Common gull	<i>Larus canus</i>		1			1	2
Common sandpiper	<i>Actitis hypoleucos</i>					3	3
Cormorant	<i>Phalacrocorax carbo</i>					2	2
Corn bunting	<i>Emberiza calandra</i>	UK BAP SBL				1	1
Crossbill	<i>Loxia curvirostra</i>	Schedule 1				3	3
Cuckoo	<i>Cuculus canorus</i>	UK BAP SBL				1	1
Curlew	<i>Numenius arquata</i>	UK BAP SBL		4	4	3	11
Goldfinch	<i>Carduelis carduelis</i>					2	2
Grasshopper warbler	<i>Locustella naevia</i>	UK BAP SBL		1			1
Great Black-backed gull	<i>Larus marinus</i>					1	1
Great Spotted woodpecker	<i>Dendrocopos major</i>					1	1
Grey heron	<i>Ardea cinerea</i>					1	1
Grey wagtail	<i>Motacilla cinerea</i>					1	1
Greylag goose	<i>Anser anser</i>					2	2
Herring gull	<i>Larus argentatus</i>	UK BAP SBL				1	1
House martin	<i>Delichon urbicum</i>					2	2
Jackdaw	<i>Corvus monedula</i>					1	1
Jay	<i>Garrulus glandarius</i>					1	1
Kestrel	<i>Falco tinnunculus</i>	SBL			2		2
Lapwing	<i>Vanellus vanellus</i>	UK BAP SBL		2	5	2	9
Lesser Black-backed gull	<i>Larus fuscus</i>					4	4
Lesser redpoll	<i>Acanthis cabaret</i>	UK BAP SB				12	12

Species	Scientific Name	Conservation Designation ²	Confirmed	Probable	Possible	Non-breeding	Grand Total
Linnet	<i>Linaria cannabina</i>	UK BAP SBL				1	1
Mallard	<i>Anas platyrhynchos</i>		1				1
Merlin	<i>Falco columbarius</i>	Annex 1 Schedule 1 SBL		1			1
Mistle thrush	<i>Turdus viscivorus</i>					1	1
Oystercatcher	<i>Haematopus ostralegus</i>				1	8	9
Pied wagtail	<i>Motacilla alba</i>				1	2	3
Raven	<i>Corvus corax</i>					15	15
Red grouse	<i>Lagopus lagopus scoticus</i>	UK BAP SBL				1	1
Redshank	<i>Tringa totanus</i>					1	1
Reed bunting	<i>Emberiza schoeniclus</i>	UK BAP SBL			3	1	4
Robin	<i>Erithacus rubecula</i>				1	2	3
Sand martin	<i>Riparia riparia</i>					2	2
Sedge warbler	<i>Acrocephalus schoenobaenus</i>				1	2	3
Siskin	<i>Spinus spinus</i>	SBL				4	4
Skylark	<i>Alauda arvensis</i>	UK BAP SBL		46	24	9	79
Snipe	<i>Gallinago gallinago</i>			1	2	4	7
Song thrush	<i>Turdus philomelos</i>	UK BAP SBL		1			1
Sparrowhawk	<i>Accipiter nisus</i>					2	2
Starling	<i>Sturnus vulgaris</i>	UK BAP SBL				1	1
Swallow	<i>Hirundo rustica</i>		1			10	11
Swift	<i>Apus apus</i>	SBL				4	4
Tree pipit	<i>Anthus trivialis</i>	SBL				1	1
Willow warbler	<i>Phylloscopus trochilus</i>			3	6	1	10
Wood pigeon	<i>Columba palumbus</i>					7	7
Wren	<i>Troglodytes troglodytes</i>				1	1	2
Grand Total			3	64	58	153	278

² – Annex 1 – listed on Annex 1 of the Birds Directive;

Schedule 1 – listed on Schedule 1 of the Wildlife and Countryside Act (1981) as amended;

Species	Scientific Name	Conservation Designation ²	Confirmed	Probable	Possible	Non-breeding	Grand Total
<p>SBL – Listed on Scottish Biodiversity List; Amber/Red – categorised as amber or red on Birds of Conservation Concern.</p>							

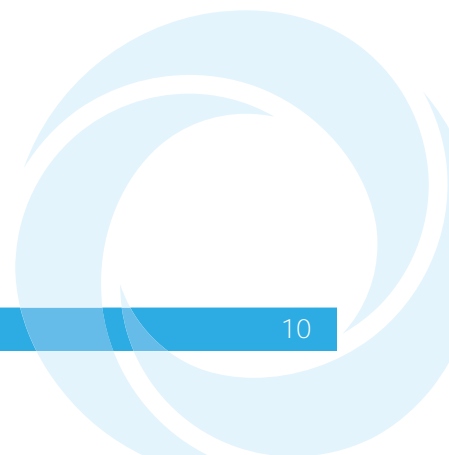


4 Conclusions

Over the course of the survey season, six hours of vantage point survey per vantage point per month were carried out between March 2019 and August 2019, as well as four breeding bird and raptor surveys between the months of April - July. In the VP surveys seven species were recorded with Curlew and Lapwing being the most commonly recorded species. In the Breeding Bird Surveys, 54 species were recorded in total. Sensitive species recorded included one Merlin territory presumably in the 1 km buffer (because young were observed, the actual territory location is not known and could have been outside the survey area), eight Curlew territories and three Snipe territories. These species are known to be sensitive to wind farms.

5 References

SNH. (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms.*



6 Figures

Figure 1: Map showing the Vantage Point location and viewshed.

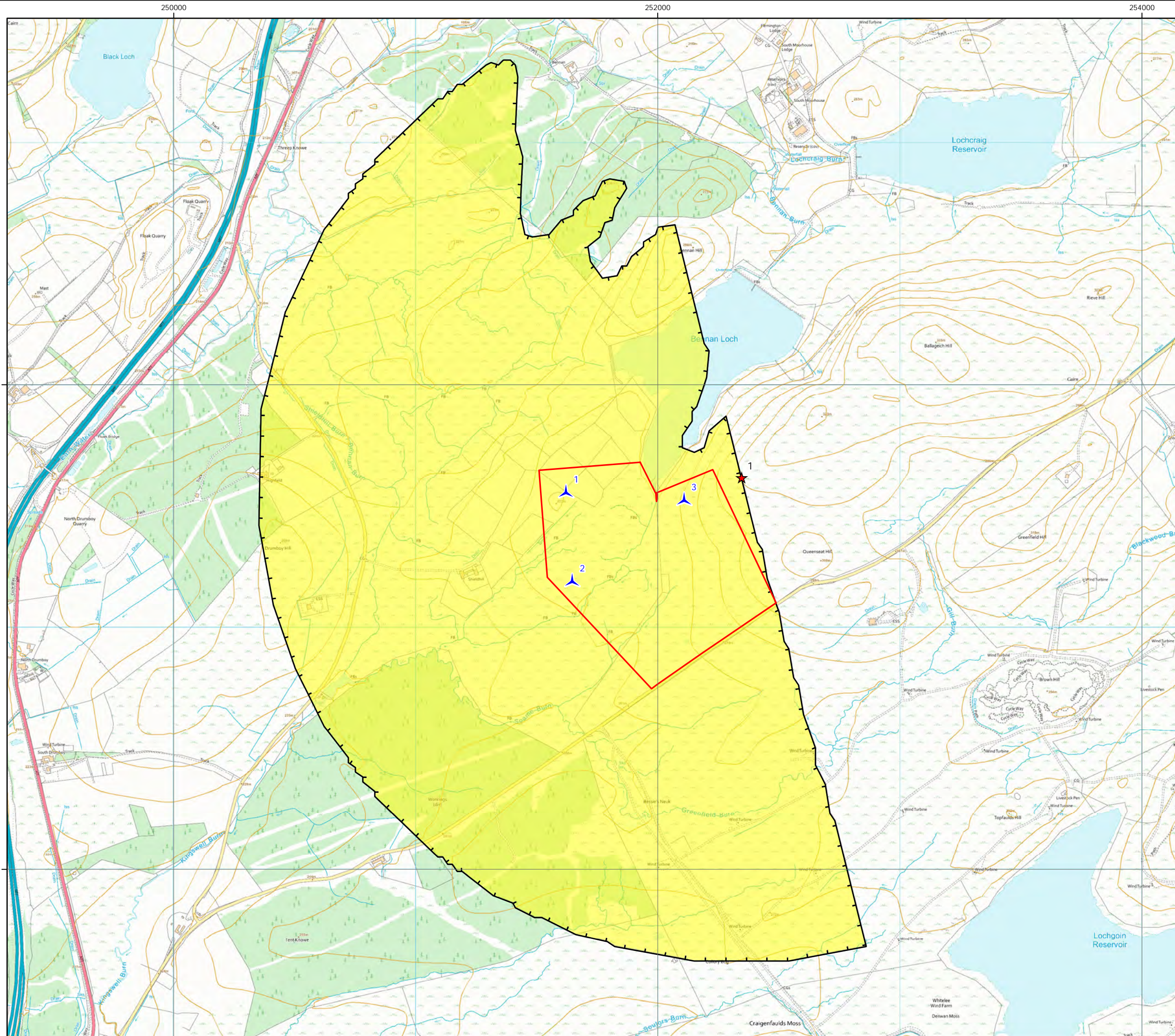
Moorshield Wind Farm



Figure 1
Vantage Point Location and Viewshed

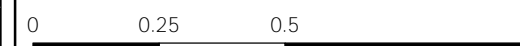
Key

- Site boundary
- ▲ Proposed turbine
- ★ Vantage Point
- VP Viewshed
- VP1



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

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



Scale @ A3:
1:15,000



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Figure 2: The survey area showing the survey area of the Breeding Bird Survey and the Raptor Survey.

Moorshield Wind Farm



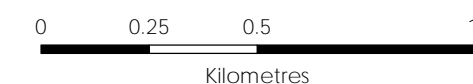
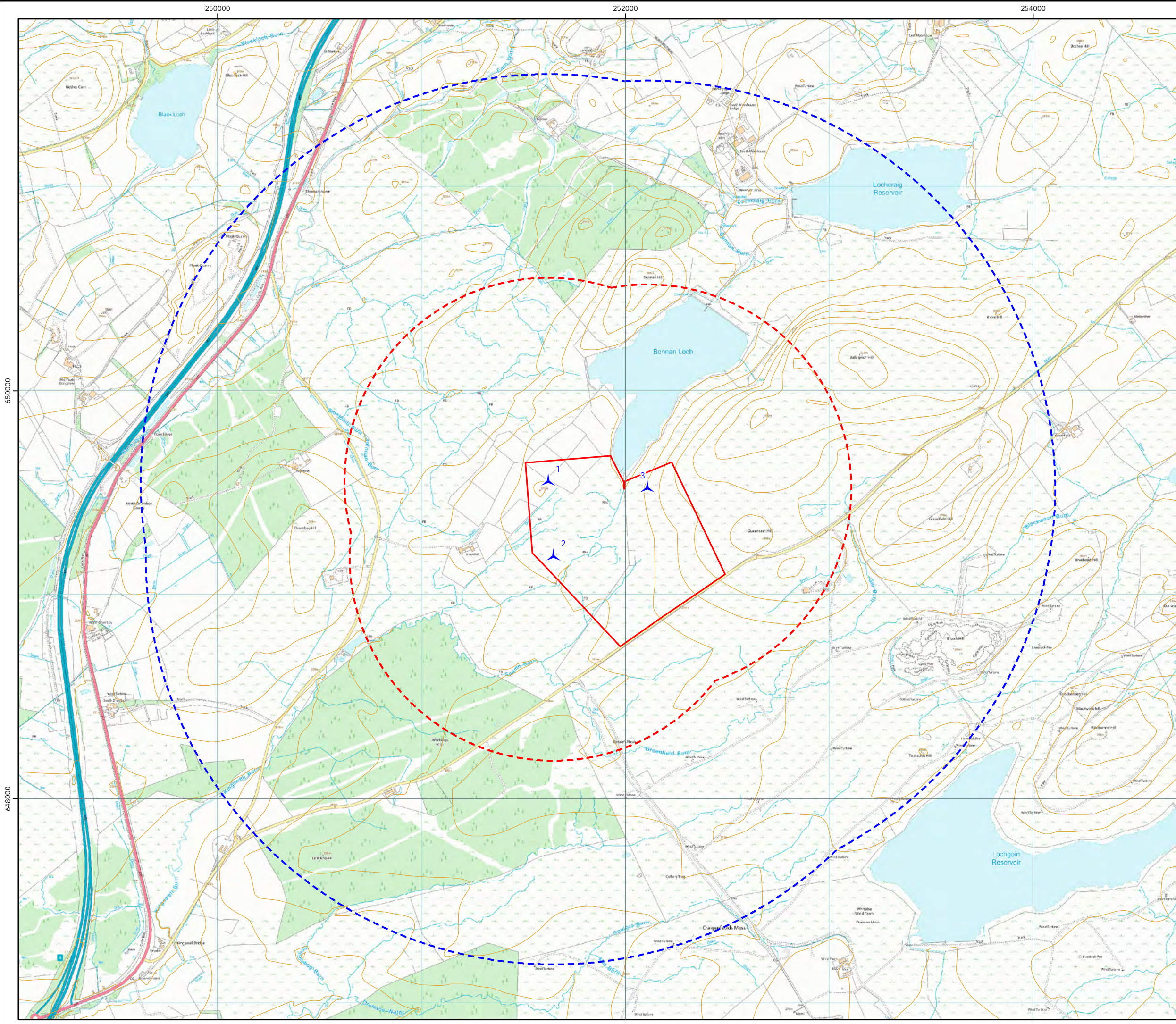
Figure 2
Ornithology Survey Areas

Key

- Site boundary
- ▲ Proposed turbine
- Breeding bird
- Breeding raptor

Survey areas

- Breeding bird
- Breeding raptor



Scale @ A3:
1:17,500



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Figure 3: Map showing the flightlines from the VP surveys for the target species.

Moorshield Wind Farm



Figure 3
Vantage Point Flightlines

Key

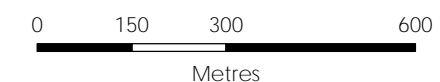
- Site boundary
- Turbines
- Vantage Point

Target species registrations

- Cormorant
- Curlew
- Lapwing
- Peregrine

Height Band

- Below 20m height
- 20 - 150m height
- Above 150m height
- On ground
- Heard only



Scale @ A3:
1:12,000



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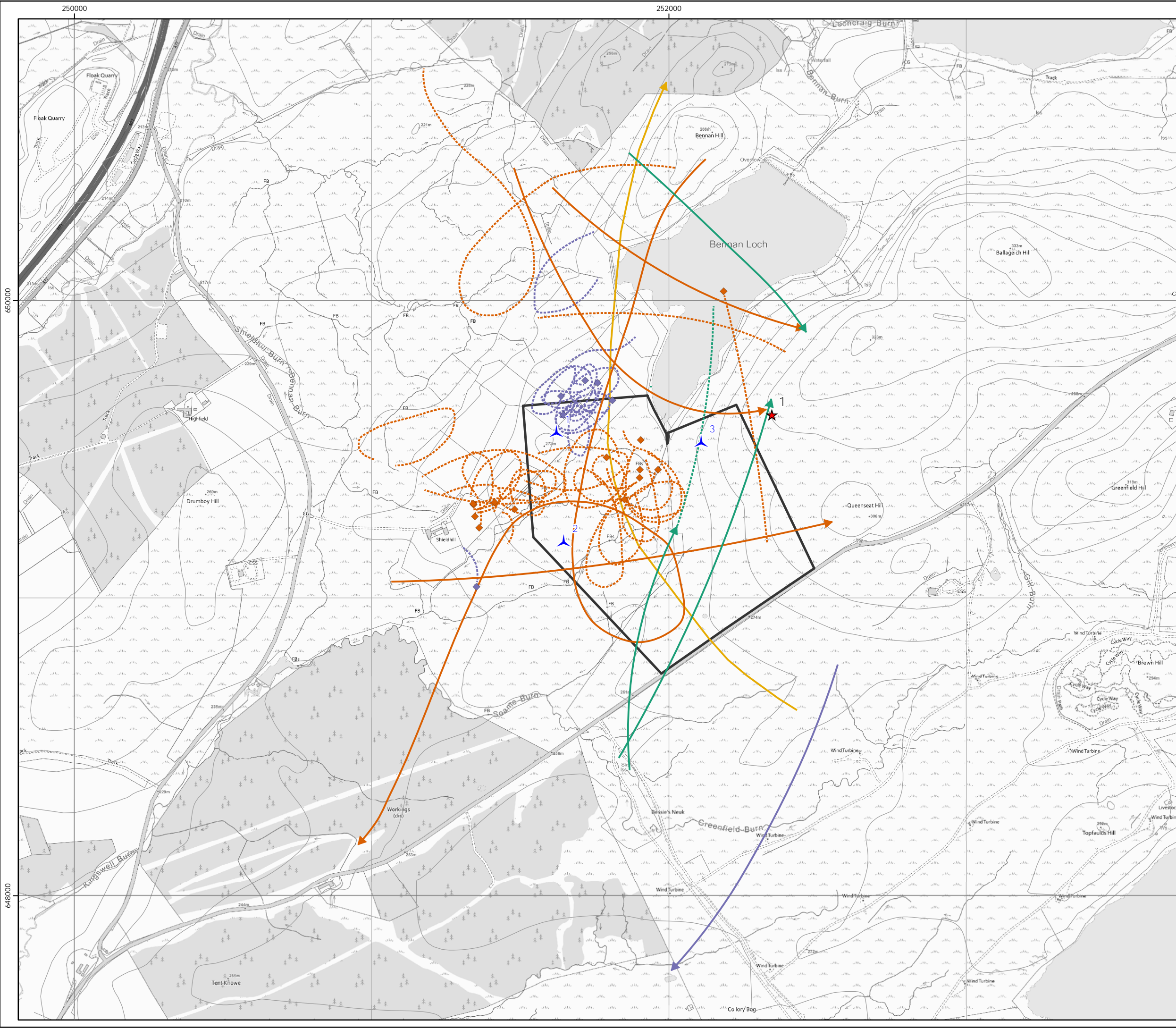


Figure 4: Results from the Breeding Bird Survey

Moorshield Wind Farm



Figure 4
Breeding Bird Survey Results

Key

- Breeding bird survey area
- Breeding raptor survey area

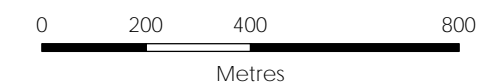
Category

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

Breeding Status

- Confirmed
- Probable
- Possible
- Non-breeding

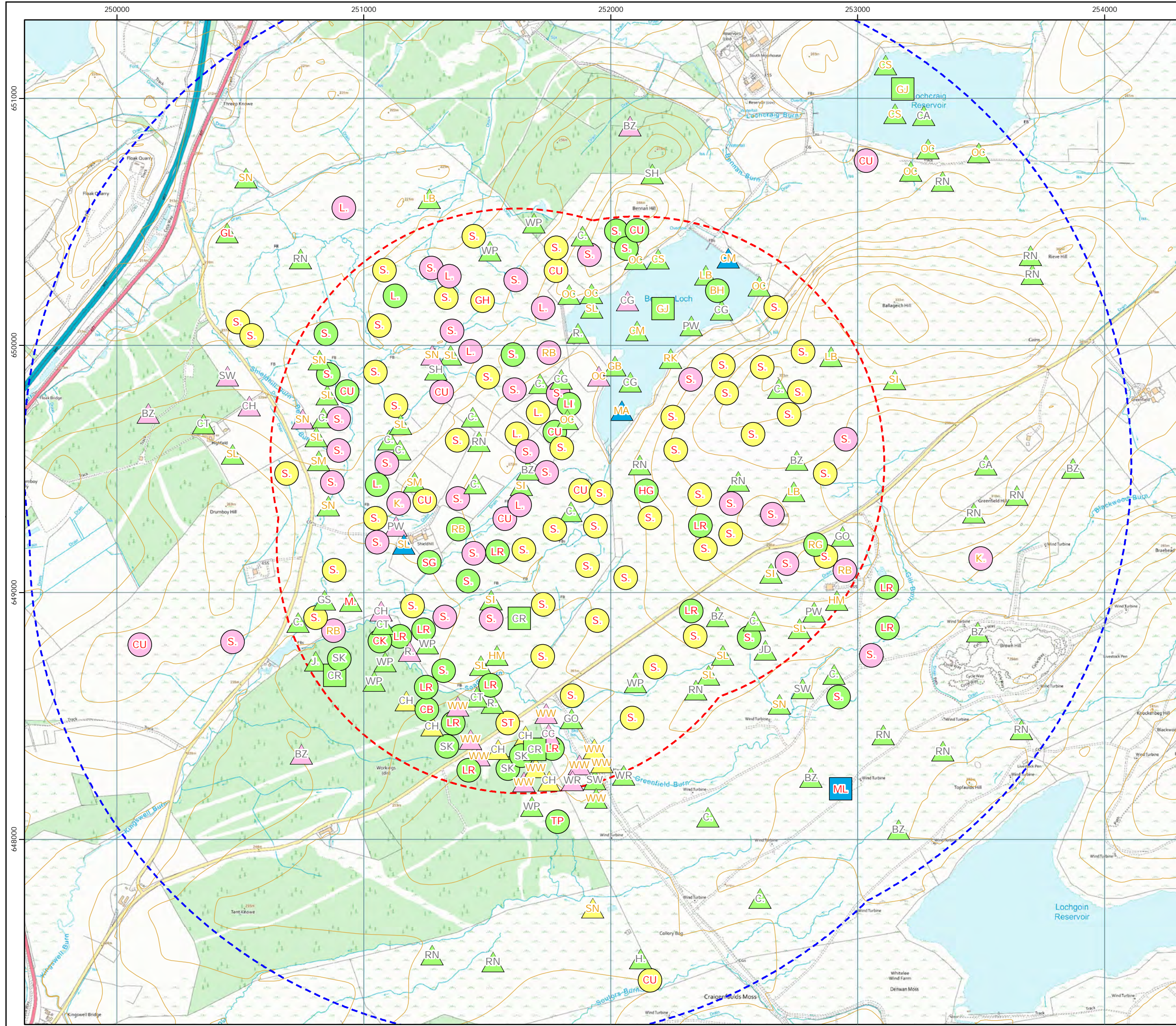
Red listed species - BOCC
Amber listed species - BOCC



Scale @ A3:
1:14,500



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Appendices

Appendix A. Dates, times and weather conditions for Vantage Point surveys.

Table 5: Dates, times and weather conditions for VP surveys.

Survey Date	VP Type	Start Time	Mean Cloud Cover (eights)	Modal Visibility	Modal Precipitation	Mean Temperature (°C)	Mean Wind Speed (Beaufort Scale)	Modal Wind Direction
30/03/2019	Diurnal	06:55-09:55	4	> 2km	None	8	1	NW
		10:25-13:25	7	1km - 2km	Light Intermittent	5	1	NW
28/04/2019	Diurnal	05:45-08:45	8	> 2km	None	6	3	S
		09:15-12:15	6	> 2km	None	7	3	S
25/05/2019	Diurnal	15:05-18:05	7	> 2km	None	12	2	NW
		18:35-21:35	8	> 2km	None	10	2	NW
22/06/2019	Diurnal	04:35-07:35	8	> 2km	None	9	1	S
		08:05-11:05	8	> 2km	None	13	2	S
20/07/2019	Diurnal	15:15-18:15	3	> 2km	None	16	3	WNW
		18:45-21:45	3	> 2km	None	17	3	WNW
25/08/2019	Diurnal	06:10-09:10	2	> 2km	None	20	2	ESE
		09:40-12:40	1	> 2km	None	15	1	ESE

Appendix B. Target bird flight record details

Table 6: Target bird flightline record details for all target species observed

Date	Species	VP Number	Time First Observed	Number of Birds	Height Band	Height Band (s)	Seconds at Risk height	Average Height (m)	Record Type
30/03/2019	Cormorant	2	08:36	1	A	51	0	10	Standard
30/03/2019	Cormorant	2	08:36	1	B	49	49	30	Standard
30/03/2019	Curlew	2	09:27	3	B	149	447	30	Standard
30/03/2019	Curlew	2	11:57	2	A	99	0	10	Standard
28/04/2019	Curlew	1	06:12	1	A	148	0	10	Standard
28/04/2019	Curlew	1	08:11	1	A	122	0	15	Standard
28/04/2019	Curlew	1	11:33	1	A	85	0	10	Standard
28/04/2019	Lapwing	1	09:41	1	A	62	0	5	Standard
28/04/2019	Mallard	1	07:01	2	B	114	228	30	Standard
25/05/2019	Cormorant	1	17:05	1	B	87	87	30	Standard
25/05/2019	Curlew	1	15:18	1	A	43	0	7	Standard
25/05/2019	Curlew	1	15:35	1	A	82	0	7	Standard
25/05/2019	Curlew	1	16:47	1	A	202	0	7	Standard
25/05/2019	Curlew	1	17:36	1	A	190	0	10	Standard
25/05/2019	Curlew	1	17:49	1	A	50	0	7	Standard
25/05/2019	Curlew	1	18:46	1	A	51	0	5	Standard
25/05/2019	Curlew	1	19:26	1	A	114	0	7	Standard
25/05/2019	Curlew	1	19:32	1	A	55	0	7	Standard
25/05/2019	Curlew	1	20:04	1	A	105	0	7	Standard

Date	Species	VP Number	Time First Observed	Number of Birds	Height Band	Height Band (s)	Seconds at Risk height	Average Height (m)	Record Type
25/05/2019	Lapwing	1	16:28	1	A	115	0	5	Standard
25/05/2019	Lapwing	1	17:20	2	A	100	0	3	Standard
25/05/2019	Lapwing	1	19:09	2	A	101	0	3	Standard
25/05/2019	Oystercatcher	1	19:03	5	A	42	0	3	Standard
22/06/2019	Cormorant	1	09:56	1	B	89	89	30	Standard
22/06/2019	Curlew	1	05:19	1	A	52	0	10	Standard
22/06/2019	Curlew	1	06:59	1	A	45	0	7	Standard
22/06/2019	Curlew	1	08:07	1	A	44	0	7	Standard
22/06/2019	Curlew	1	09:20	1	A	65	0	7	Standard
22/06/2019	Lapwing	1	04:53	2	A	78	0	3	Standard
22/06/2019	Lapwing	1	05:26	3	A	61	0	3	Standard
22/06/2019	Lapwing	1	06:10	1	A	11	0	2	Standard
22/06/2019	Lapwing	1	08:35	4	A	123	0	3	Standard
22/06/2019	Lapwing	1	09:01	1	A	7	0	2	Standard
22/06/2019	Lapwing	1	10:38	4	A	145	0	3	Standard
20/07/2019	Cormorant	1	20:26	1	B	72	72	10	Standard
20/07/2019	Curlew	1	16:01	4	B	117	468	40	Standard
20/07/2019	Curlew	1	16:25	1	B	85	85	30	Standard
20/07/2019	Curlew	1	17:47	1	A	16	0	5	Standard
20/07/2019	Curlew	1	19:07	2	B	110	220	50	Standard
20/07/2019	Curlew	1	19:43	1	A	12	0	7	Standard
20/07/2019	Lapwing	1	19:32	4	B	130	520	30	Standard
20/07/2019	Oystercatcher	1	17:09	3	A	29	0	10	Standard

Date	Species	VP Number	Time First Observed	Number of Birds	Height Band	Height Band (s)	Seconds at Risk height	Average Height (m)	Record Type
25/08/2019	Peregrine	1	11:27	1	B	196	196	50	Standard
25/08/2019	Teal	1	08:37	3	A	38	0	38	Standard