

TECHNICAL APPENDIX 9.1:

Bird Survey Report

2021 – 2022

Aultmore Wind Farm Redesign

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SLR 

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1.0 Executive Summary

The purpose of this report is to present the results of the baseline ornithology surveys undertaken for the proposed development, between March 2021 – February 2022 and June/ July 2022.

The aim of these surveys was to provide baseline data on the breeding and non-breeding bird populations within the proposed development Site and species-specific survey buffers, in order to inform an Ecological Impact Assessment (EIA). This report does not provide advice on potential impacts or mitigation for the proposed development.

Flight activity surveys were carried out at the Site during March 2021 to February 2022.

Flight activity was recorded by ten primary target species (greylag goose, pink-footed goose, whooper swan, peregrine, kestrel, hen harrier, goshawk, osprey, curlew and common snipe).

Breeding wader surveys were completed between April and July 2021. Suitable habitat for waders is restricted to the 500m survey buffer. There were consequently very few waders recorded: curlew, snipe and lapwing. Of these, curlew was the most commonly recorded with three displaying birds and three non-displaying birds noted during the April wader surveys. However, subsequent visits indicated that these were birds commuting through the local area and there were no confirmed territories within the 500m survey buffer. Similarly, the records of lapwing and snipe were considered to be of commuting birds only.

Species-specific raptor surveys were undertaken within 2km of the Site between April and July 2021. Suitable breeding habitat exists for forest/ woodland species, in particular goshawk, which was the most frequently recorded raptor. Although breeding was not confirmed, the spatial distribution of goshawk records indicates that up to two breeding pairs may be present. In addition, kestrel and buzzard were recorded within the 2km survey buffer. The other raptor species recorded during the flight activity surveys (noted above) were commuting through the Site only and were not using the Site for breeding or roosting.

Other surveys carried out at the Site were for forest grouse (capercaillie and black grouse) and crested tit. In addition, a suitability assessment of the small lochans within 1km of the Site was carried out for breeding divers, grebes and common scoters. None of these surveys recorded any target species.

Following the first year of surveys, a review of the available ornithology data for the Site and surrounding area was undertaken to inform consultation with NatureScot on the survey effort required for the Site. On the basis of this data review NatureScot confirmed that a single year of data was sufficient to inform the EIA.

2.0 Introduction

2.1 Background

Vattenfall Wind Power Ltd ('Vattenfall') is seeking to redesign the consented Aultmore Wind Farm at Aultmore Forest, Moray (the Site). The location of the Site is shown in **Figure 9.1.1**. The proposed Aultmore Wind Farm Redesign (the proposed development) would be sited within Aultmore Forest, which sits across two hill tops, between Keith and Buckie.

The proposed development comprises of up to 16 turbines. The specific turbine model has so far not been selected, however, to inform modelling and assessment, a wind turbine with a maximum height to blade tip of 200m and an maximum generating capacity of 6.6MW has been assumed. Vattenfall will select the candidate turbine prior to construction. Based on the anticipated generational capacity, Vattenfall intends to submit an application for consent for the proposed development to Scottish Ministers under section 36 of the Electricity Act 1989. In addition to the application for consent in terms of section 36 of the Electricity Act, a request will also be made that a direction be issued under section 57(2) of the Town and Country Planning (Scotland) Act that planning permission be deemed to be granted.

There is a large amount of historical baseline data for parts of the Site from the Environmental Statement (ES) and Supplementary Environmental Information (SEI) that accompanied the original planning application (ref 07/02375/EIA) for the consented Aultmore Wind Farm. Updated survey data for the whole Site is presented in this report.

2.2 Purpose of This Report

This report outlines the surveys undertaken and methods used during the baseline ornithology surveys. It summarises the survey data obtained and provides descriptions of the legal and conservation status of the species recorded.

The assessment of impacts resulting from the proposed development and the development of mitigation measures, if required, are covered in **Chapter 9: Ornithology** of the EIA Report.

2.3 Desk Study

A desk study was undertaken to inform the Aultmore Wind Farm Redesign Scoping Report (SLR 2021)¹ and Ornithology Data Review (SLR 2022)², the results of which have been summarised below.

2.3.1 Designated Sites

A desk study was undertaken via the NatureScot SiteLink website (NatureScot, 2021)³ to identify statutorily designated sites within 20km of the proposed development which are designated for their avian interest (including Special Protection Areas (SPAs) and SSSIs). There are four designated sites (SPAs) for ornithological interests located within 20km of the Site boundary, **Table 2-1** details the sites and their distance and direction from the Site.

Table 2-1
Statutory Designated Sites

Site Name and Designation	Distance from Application Site	Direction from Application Site	Breeding season qualifying features
Moray Firth SPA	5.3km	North-west	Supports migratory species including: <ul style="list-style-type: none"> • Greater scaup (<i>Aythya marila</i>), • Common eider (<i>Somateria mollissima</i>); • Long-tailed duck (<i>Clangula hyemalis</i>), • Velvet scoter (<i>Melanitta fusca</i>); • Common goldeneye (<i>Bucephala clangula</i>); • Red-breasted merganser (<i>Mergus serrator</i>); and

¹ SLR (2021). *Proposed Aultmore Wind Farm Redesign: Scoping Report*. Document Ref: 404.03640.00016.

² SLR (2022). *Aultmore Wind Farm Redesign: Data Review*. Report to NatureScot.

³ NatureScot. (2021). SiteLink. Available at: <https://sitelink.nature.scot/home>

Site Name and Designation	Distance from Application Site	Direction from Application Site	Breeding season qualifying features
			<ul style="list-style-type: none"> European shag (<i>Phalacrocorax aristotelis</i>).
Moray and Nairn Coast SPA	6.15km	North-west	Supports internationally important migratory species including populations of: <ul style="list-style-type: none"> Pink-footed goose (<i>Anser brachyrhynchus</i>); Greylag goose (<i>Anser anser</i>); and Redshank (<i>Tringa totanus</i>). It also supports Annex 1 species such as osprey (<i>Pandion haliaetus</i>) and bar-tailed godwit (<i>Limosa lapponica</i>).
Tips of Corsemaul and Tom Mor SPA	13km	South	Supports breeding populations of European importance common gull (<i>Larus canus</i>).
Loch Spynie SPA	18km	North-west	Supports internationally important populations of breeding greylag geese.

2.3.2 Other Ornithological Data

In addition, the data review considered data collected during ornithology surveys at the Aultmore Wind Farm Site during 2006/2007 (Hyder, 2007)⁴ and 2002/2003 (AMEC, 2003)⁵, as well as constructed wind farms within 10km of the Site including Myreton Crossroads 2 (1.5km from Site) (RSK, 2009)⁶ and Lurg Hill (2.5km from Site) (Vento Ludens, 2017)⁷.

The data search found 56 species of bird recorded within 2km of the proposed Site. Protected species recorded include osprey (*Pandion haliaetus*), hen harrier (*Circus cyaneus*), red kite (*Milvus milvus*), peregrine falcon (*Falco peregrinus*), barn owl (*Tyto alba*), redwing (*Turdus iliacus*) and white-tailed eagle (*Haliaeetus albicilla*).

⁴ Hyder. (2007). Aultmore Wind Farm Environmental Statement: Ecology Chapter. Appendix 10A (Volume 3)

⁵ AMEC. (2003). Aultmore Wind Farm Environmental Impact Assessment.

⁶ RSK Group PLC. (2009). Myreton Crossroads 2 Phase 1 Habitat Survey.

⁷ Vento Ludens. (2017). Lurg Hill Wind Farm Environmental Statement (Volume 1) Chapter 13: Ecology and Ornithology.

2.4 Scope of Work

The scope of the bird survey programme in 2021/ 2022 was designed and undertaken with reference to current NatureScot (NS) guidance (SNH 2017). Given the location of the Site and the range of habitats present the scope of ornithological survey work during the 2021 breeding season included the following:

- Flight activity surveys from four fixed Vantage Points (VPs), using viewsheds of 2km;
- Breeding wader surveys;
- Breeding raptor surveys;
- Black grouse lek surveys;
- Capercaillie transect surveys;
- Crested tit transect surveys;
- Lochan surveys; and
- Access track survey.

2.5 Target Species

Target species for the surveys were chosen considering the location of the Site and were defined by legal and/ or conservation status and vulnerability to impacts potentially caused by wind turbines, as defined in SNH (2017).

2.5.1 Primary Target Species

The following species were considered as primary target species:

- All raptors and owls listed on Annex I of the Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981;
- Kestrel (*Falco tinnunculus*)⁸;
- All wader species;
- All diver species;
- All grouse species (included capercaillie (*Tetrao urogallus*);
- Crested tit (*Lophophanes cristatus*); and
- All wild goose, swan and duck species, except for Canada goose (*Branta canadensis*) and mallard (*Anas platyrhynchos*).

2.5.2 Secondary Target Species

Non-Annex I and/ or Schedule 1 raptor species (other than kestrel which is a primary target species):

- Buzzard (*Buteo buteo*)
- Sparrowhawk (*Accipiter nisus*)

Other species of lesser conservation importance which are considered to be potentially vulnerable to impacts from wind farm developments.

⁸ Due to conservation status as an Amber species and the species vulnerability to wind turbines

3.0 Survey Methodology

3.1 Survey Logistics

The ornithological field surveys were undertaken by Stagfire Ecological Surveys (details provided in Appendix 01) and were undertaken according to current NatureScot (NS) guidance (SNH 2017)⁹. All surveyors involved either held or were agents on appropriate Schedule 1 licences issued by NS.

Full details of survey visits, including survey dates, start and finish times, observers and weather conditions are provided in Appendix 01.

The ornithology survey areas including the appropriate buffer around the Site boundary are shown on **Figure 9.1.1**.

3.2 Flight Activity Surveys

Standard flight activity surveys were conducted from four VP locations (see **Figure 9.1.2**) for the breeding and non-breeding seasons. The details are summarised in **Table 3-1** and **Table 3-2** for the breeding and non-breeding seasons respectively.

SNH (2017) recommends a minimum of 36 hours survey time per VP for each breeding and non-breeding season. Given the potential sensitivity of the Site for a range of species and migratory geese, double the VP hours were undertaken in March, April, September and October 2021. **Figure 9.1.2** shows the VP locations along with the associated area of visibility at 20m above ground level (the viewsheds).

Activity patterns and time spent flying within the area viewable from each VP were recorded and the flight activity of primary and secondary target species (as defined in section 1.5) was quantified. This information will enable an assessment to be made of potential collision and displacement impacts prior to the commencement of construction.

The main purpose of VP watches is to collect data on primary target species that will enable estimates to be made of:

- The time spent flying over the Site;
- The relative use by birds of different parts of the Site;
- The proportion of flying time spent within the provisional upper and lower risk height limits as determined by the rotor diameter and rotor hub height; and
- An index of flight activity for secondary target species within the Site. A summary of observations of secondary target species was recorded at the end of each five-minute period during VP watches, in accordance with current SNH guidance.

For each primary target species observation, the following details were recorded:

- Time of observation;
- Duration of flight line (seconds);
- Species, age and sex (where determinable); and
- Time spent within each height band.

⁹ SNH (2017). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms, Version 2.

To incorporate the potential dimensions of the turbines likely to be used, the height bands used were as follows:

- 1: 0-25m
- 2: 25-180m
- 3: 180-200m
- 4: >200m

Table 3-1
Standard VP Surveys undertaken at Aultmore, March – August 2021

VP Number	OS Grid Reference	Hours of Survey Completed (hrs)						
		Mar	Apr	May	Jun	Jul	Aug	Total
1	NJ 42377 58149	12	12	6	6	6	6	48
2	NJ 40257 56149	12	12	6	6	6	6	48
3	NJ 45925 59642	12	12	6	6	6	6	48
4	NJ 47359 57535	12	12	6	6	6	6	48

Table 3-2
Standard VP Survey undertaken at Aultmore, September 2021 – February 2022

VP Number	OS Grid Reference	Hours of Survey Completed (hrs)						
		Sep	Oct	Nov	Dec	Jan	Feb	Total
1	NJ 42377 58149	12	12	6	6	6	6	48
2	NJ 40257 56149	12	12	6	6	6	6	48
3	NJ 45925 59642	12	12	6	6	6	6	48
4	NJ 47359 57535	12	12	6	6	6	6	48

3.3 Breeding Wader Surveys

Surveys for breeding waders were carried out within the Site boundary and a 500m buffer (where accessible) around it (following SNH (2017) which includes recommendations set out in Calladine *et al.* (2009)¹⁰, requiring an adapted Brown & Shepherd (1993)¹¹ method with four survey visits at least seven days apart between mid-April and the end of July 2021. Due to the scale of the Site the surveys were phased over a period of two to six days depending on how many surveyors were available.

The four survey visits were carried out as follows:

- Visit 1: 12th and 22nd April.
- Visit 2: 9th, 16th, 19th, 22nd and 28th May.
- Visit 3: 3rd, 22nd and 23rd June.
- Visit 4: 4th, 18th, 19th, 20th, 29th and 30th July.

The breeding wader surveys and breeding raptor surveys were combined due to the lack of open ground within Site boundary.

All target species (including all wader species) were recorded during each visit. Registrations were marked onto 1:25,000 scale survey maps using standard British Trust for Ornithology (BTO) species and activity codes for use in post-survey analysis.

Birds were considered to be confirmed breeding if:

- They were observed displaying or singing on more than one visit;
- Nests, eggs, or young were located;
- Adults repeatedly alarm called;
- Distraction displays were seen; and/ or
- Territorial disputes were observed.

Birds were considered to be probably or possibly (i.e. unconfirmed) breeding if:

- They were observed displaying or singing on one visit (with the exception of obvious passage migrants in spring); or
- A pair of birds was observed in suitable habitat for nesting.

Other records were considered to be of non-breeding birds, failed breeders, birds loafing, feeding or on passage to other areas.

3.4 Breeding Raptor Surveys

Species-specific surveys were undertaken for all raptors likely to occur, following methods outlined within Hardey *et al.* (2013)¹², within 2km of the Site (where accessible) (**Figure 9.1.1**).

¹⁰ Calladine, J., Garner, G., Wernham, C. & Thiel, A. (2009) The influence of survey frequency on population estimates of moorland breeding birds. *Bird Study*, 56: 3, 381-388.

¹¹ Brown, A.F. and Shepherd, K.B (1993): *A Method for Censusing Upland Breeding Waders*. *Bird Study*, Vol. 40, no.3, pp. 189 -195.

¹² Hardey, J., Crick, H.Q.P., Wernham, C., Riley, H., Etheridge, B., Thompson, D. (2013). *Raptors: A field guide for surveys and monitoring* (3rd Edition).

During the surveys all accessible suitable raptor breeding habitat within this area, including open moorland/ rough grassland, moorland/ forest edge, rock crags and outcrops, was covered. Data collected during VP surveys and moorland breeding bird surveys were also used to define territories within the survey buffer.

The 2021 breeding season surveys were carried out as follows:

- April: 12th.
- May: 9th, 16th, 19th, 22nd and 28th.
- June: 3rd, 13th, 18th, 22nd and 23rd.
- July: 4th, 18th, 19th, 20th, 29th and 30th.

3.5 Black Grouse Lek Surveys

The survey methodology was based on the methodology written for the 1995-96 national black grouse (*Tetrao tetrix*) survey by Etheridge and Baines (1995)¹³, and described by Gilbert *et al.* (1998)¹⁴. This methodology is recommended for surveys for onshore wind farm projects in Scotland (SNH 2017)⁹.

All habitats considered suitable for lekking birds (tracks, old quarries, heavily grazed upland pasture, heather clearings within forest and heather moorland), within the Site were surveyed within two to three hours of sunrise. Surveys were conducted on foot, with frequent stops to listen for the 'bubbling' calls of displaying birds, which are audible up to 1km away.

The 2021 lek surveys were carried out as follows:

- April: 19th and 21st.
- May: 16th and 19th.

3.6 Capercaillie Transect Survey

Two visits were undertaken, on the 19th and 21st April 2021 to assess the habitat suitability for capercaillie and to search for evidence of their presence. Surveys followed the Pinewood bird survey method as described in Gilbert *et al* (1998)¹⁴ looking for evidence described in SNH Capercaillie Survey Methods (2013)¹⁵.

3.7 Crested Tit Transect Survey

Two crested tit transect surveys were undertaken on the 19th and 21st April 2021 alongside the capercaillie surveys, to search for suitable habitat and evidence of their presence. Surveys followed the Pinewood bird survey method as described in Gilbert *et al* (1998)¹⁴.

¹³ Etheridge, B. & Baines, D. (1995). *Instructions for the Black Grouse Survey 1995/6: a Joint RSPB/GCT/JNCC/SNH Project*. Unpublished.

¹⁴ Gilbert, G., Gibbons, D.W. and Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Sandy.

¹⁵ SNH (2013). *Guidance Licensing – Capercaillie survey methods*. <https://www.nature.scot/doc/guidance-licensing-capercaillie-survey-methods>

3.8 Lochan Surveys

One visit was undertaken on the 4th June 2021 to all the small lochs and lochans within 1km to assess suitability for breeding divers, grebes and common scoter (*Melanitta nigra*)¹⁶. Lochans were surveyed in order to establish the likely presence/ absence of these species and the suitability of the habitat.

Survey methods followed those outlined in Gilbert *et al.* (1998)¹⁴ as per SNH (2017)⁹

Lochans were also checked during breeding wader and raptor surveys on the dates specified for those surveys.

3.9 Access Track Survey

An additional area of land to the west of the Site boundary, encompassing two variations to the proposed access route into Aultmore forest, was surveyed in late June – mid July 2022, (with visits on 28th June & 19th July). The corresponding 'survey area' encompassed each proposed access route and an associated 250m buffer, as displayed in **Figure 9.1.1**.

3.10 Survey Limitations

Surveys were carried out within the parameters of current guidelines (both in terms of timings and weather conditions).

With regard to viewshed coverage, there is a small gap in the visibility apparent (at 25m above ground level) in the 500m buffer of proposed turbine locations in the south-western part of the Site due to the nature of the terrain (**Figure 9.1.2**). Otherwise the visibility across the eastern turbine array plus 500m buffer is good. Therefore, it is considered that the vantage point data will be representative of the Site as a whole and sufficient to inform a robust assessment of the proposed development.

Access beyond the red-line boundary was generally not possible beyond the 500m buffer where this was on private land. This is not considered to be significant with regard to identifying raptor breeding territories, as generally these areas could be viewed from a distance.

¹⁶ The Site does not lie within the normal breeding range of red-throated diver, black-throated diver or common scoter within Scotland

4.0 Survey Results

4.1 Flight Activity Surveys March to August 2021

Flight activity data recorded from VPs by primary target species are summarised in **Table 4-1** and the following text. This gives the number of flights recorded per month plus the cumulative number of birds per month, in all surveys.

Full details of primary target species flights are provided in Appendix 01. Primary target species flights from all VPs are shown on **Figure 9.1.3** (pink-footed goose), **Figure 9.1.4** (Greylag Goose and Whooper Swan), **Figure 9.1.5** (Curlew) and **Figure 9.1.6** (Raptors).

Table 4-1
Standard VPs; Number of Primary Target Species Flights, March – August 2021

Species	Total number of flights (total birds) per month					
	Mar	Apr	May	Jun	July	Aug
Greylag goose	1 (1)	2 (10)	0 (0)	1 (2)	0 (0)	0 (0)
Pink-footed goose	23 (1388)	13 (634)	0 (0)	0 (0)	0 (0)	0 (0)
Whooper swan	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Peregrine	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Hen harrier	1 (1)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Goshawk	8 (9)	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)
Osprey	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)
Curlew	5 (5)	5 (5)	0 (0)	0 (0)	0 (0)	0 (0)
Kestrel	5 (5)	5 (5)	0 (0)	2 (2)	0 (0)	0 (0)

4.1.1 Summary of Primary Target Species Flight Activity, March – August 2021

Greylag goose

In total four greylag goose (*Anser anser*) flights were recorded, one in March, two in April and one in June. The one flight from March was a single bird recorded flying over the South-west of Site over Coreskell Moss which appeared to be in passage. The other three flights were recorded just outside of the Site boundary to the South-west over the Ryeriggs area, the highest number of birds were recorded in April with a total of 10 birds over two flights. Greylags were recorded at heights of 10 – 50m off the ground generally flying low over Site.

Pink-footed goose

Overall pink-footed geese (*Anser brachyrhynchus*) accounted for the highest number of flights recorded during the breeding season with 36 flights in total recorded during March and April along with a total number of 2022 birds. The highest frequency of flights was during March with 23 flights recorded, many of these flights had skeins of 100 – 200 birds. Flights were concentrated to the South-west of the Site over Millstone Hill, Corsekell Moss

and around the Ryeriggs area. 10 of the flights were recorded in the North-east of the Site over Old Fir Hill, Black Hill and Hill of Clashmadin.

A summary of the number of birds recorded at each average height is summarised in **Table 4-2** below.

Table 4-2
Summary of pink-footed goose flights, March – April 2021

Average flight height (m)	Total number of birds	
	March	April
20	14	0
40	0	100
50	4	71
70	0	60
80	10	0
100	512	403
150	28	0
>200	820	0

Whooper Swan

A single flight consisting of two whooper swans (*Cygnus cygnus*) flying at an average height of 100m was recorded during March. The birds flew over farmland in the Ryeriggs area to the south-west of the Site on passage.

Peregrine

A single flight of one peregrine (*Falco peregrinus*) was recorded during March flying at an average height of above 200m. The bird appeared to be on passage, passing over the south-west edge of the forestry between the Ryeriggs area and Millstone Hill.

Hen harrier

Two hen harrier (*Circus cyaneus*) flights were recorded during the breeding season, one in March and one in April. Both flights were by a single female hen harrier flying low between 5-10m high. In March the hen harrier was recorded over Black Hill while in April the hen harrier was recorded over farmland in the Ryeriggs area outside of the Site boundary.

Goshawk

In total 11 goshawk (*Accipiter gentilis*) flights were recorded during March and April at both the north-east and south-west of the Site. One display flight with two birds present was recorded to the south-west of Site below Millstone hill, and most of the south-west flights were concentrated around Millstone hill and over the Ryeriggs area. In the north-east flights were recorded over Black hill, Old Fir Hill and Milkwell moss. Flights were generally just above or below the treeline between the average heights of 10-20m.

Osprey

During August a single flight was recorded for osprey (*Pandion haliaetus*), two birds flew over the south-west side of Site over Millstone hill. The pair were circling at an average height of 180m.

Kestrel

Kestrels were recorded in March, April and June with a total of 12 flights for 12 birds. These flights were of foraging birds most commonly at an average height of 5-10m with one flight recorded at an average height of 25m. Flights were recorded across the Site but mainly congregated around the forestry edge at the North and South-west of the Site. Five of the flights were recorded along the forestry edge at Black Hill while four flights were recorded on the open ground around the Ryeriggs area to the south-west of the Site. In addition, flights were recorded over Corsekell Moss.

Curlew

In total 10 curlew (*Numenius arquata*) flights were recorded with five in March and five in April around the Ryeriggs area to the south-west of the Site. The curlew flights were all recorded outwith of the Site boundary on areas of farmland pasture at average heights of 5-10m. No flights were recorded between May and August with very little wader activity recorded on or near to Site across all types of surveys.

4.1.2 Summary of Secondary Species Flight Activity

10 secondary species were recorded onsite during the 2021 breeding season. These were:

- Buzzard: A total of 60 flights were recorded from March-August with a maximum of three birds present during a flight. Buzzards recorded were generally onsite, circling or foraging and present across all four flight bands, however they were most present within height bands 1 and 2.
- Canada goose: One flight with a maximum of five birds was recorded in July circling over Site within height band 1.
- Common gull (*Larus canus*): A total of 17 flights were recorded from March-August with a maximum of six birds present during a flight. Common gulls were recorded both beyond and onsite within height bands one and two generally circling.
- Greater black-backed gull (*Larus marinus*): In August four flights were recorded with a maximum of one bird circling onsite. All but one flight was within height band one with the other in height band two.
- Grey heron (*Ardea cinerea*): Two grey heron flights were recorded onsite in March and April with a maximum of one bird.
- Herring gull (*Larus argentatus*): During August six herring gull flights were recorded onsite with a maximum of 18 birds counted. The flights were at height bands one and two with the birds recorded circling.
- Jay (*Garrulus glandarius*): In May one Jay flight was recorded in height band one, onsite with a maximum of one circling bird.
- Raven (*Corvus corax*): In March and August a total of four raven flights were recorded with a maximum of one bird within height band one. The ravens were recorded circling mainly onsite with one flight also extending into the buffer and beyond.
- Sparrowhawk: Two sparrowhawk flights were recorded in May onsite and within height band one.
- Lesser black-backed gull (*Larus fuscus*): A total of 24 flights were recorded across March-July with a maximum of three birds counted. The lesser black-backed gulls were mainly recorded circling onsite with one flight recorded as being beyond the buffer. They were present in height bands one and two.

4.2 Breeding Wader Surveys

There were very few records of waders recorded onsite or within the 500m buffer during the 2021 breeding season. Only three species: curlew, snipe (*Gallinago gallinago*) and lapwing (*Vanellus vanellus*) were recorded. Curlew was the most commonly recorded wader over all surveys with 10 flight lines recorded during March and April during VP surveys, three displaying birds and three non-displaying birds noted during the April wader surveys. However, displaying curlew was only noted on one visit, subsequent visits indicated there were no curlews holding territories adjacent to the Site boundary. Results are mapped in **Figure 9.1.7**

4.3 Breeding Raptor Surveys

The following species accounts provide summary details on the target raptor and owl species encountered during the 2021 surveys (all surveys combined).

4.3.1 Primary Target Species

Peregrine

No peregrine was recorded during raptor and wader surveys, only one flight of one bird being recorded during VP surveys in March 2021. The birds were likely just passing through the Site.

Hen harrier

Only two hen harrier flights were recorded in the breeding season during the VP surveys in March and April. There was no indication of hen harrier breeding within the 2km survey buffer in 2021.

Goshawk

Including VP surveys, there were 14 records of goshawk (in March, April, May, June and July). During VPs two birds were recorded displaying in March, however the other flights recorded were either circling or foraging within the Site boundary and within the 2km buffer. Flights were mainly focussed around Millstone Hill in the south-west and around Old Fir Hill in the east of Site. Although there is no confirmed breeding within the Site or 2km, it is likely that there is a small local breeding population of goshawks.

Osprey

No osprey was recorded during specific raptor surveys, only one flight of two birds were recorded during VP surveys in August 2021. The birds were likely just passing through the Site.

Kestrel

Kestrel were recorded twice during raptor surveys, and nine times during VP surveys. While they are present onsite there was no indication of breeding with all birds recorded as foraging in the area, however it is likely that there is a local breeding population.

4.3.2 Secondary Target Species

Sparrowhawk

Including VP surveys, there were only three records of sparrowhawk in the breeding season, with no indication of breeding.

Buzzard

Although buzzards were recorded during VP and Wader/Raptor surveys there is no indication of a breeding territory within 2km.

4.3.3 Other Species of Note Recorded during Raptor Surveys

Pink-footed goose

During the raptor and wader surveys in April 2021, three skeins of pink-footed geese were recorded flying over Site heading north. The skeins numbered 50, 90 and 350 birds.

Raven

Ravens were recorded three times in July 2021 during raptor surveys however there was no indication of breeding.

Red grouse

A single red grouse (*Lagopus lagopus*) was recorded on the open ground of Black Hill in April 2021.

Crossbill

Two crossbills (*Loxia curvirostra*) were recorded within the forestry around the Hill of Stonyslacks in April 2021.

4.4 Black Grouse Lek Survey

No black grouse were recorded during the black grouse surveys in April and May 2021. The Site lies outside of the normal range of black grouse in Scotland.

4.5 Capercaillie Survey

No capercaillie were recorded during the capercaillie surveys in April 2021.

4.6 Crested Tit Survey

No crested tits were recorded during the crested tit surveys in April 2021.

4.7 Lochan Survey

No divers, grebes or scoters were recorded during the lochan survey in June 2021. The lochans were noted as being very small, and therefore were unlikely to be suitable for species other than the smaller grebes.

4.8 Winter Flight Activity Surveys

Flight activity data recorded from VPs by primary target species in the non-breeding season surveys (September 2021 – February 2022) are presented in **Table 4-3**.

Table 4-3
Standard VPs; Number of Primary Target Species Flights, Sept 2021 – February 2022

Species	Total number of flights (total birds) per month					
	Sep	Oct	Nov	Dec	Jan	Feb
Greylag goose	0 (0)	2 (33)	4 (147)	1 (6)	0 (0)	0 (0)
Pink-footed goose	0 (0)	8 (1022)	1 (45)	0 (0)	0 (0)	0 (0)

Species	Total number of flights (total birds) per month					
	Sep	Oct	Nov	Dec	Jan	Feb
Whooper swan	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)
Hen harrier	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)
Goshawk	2 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Snipe	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Kestrel	6 (6)	3 (3)	6 (6)	0 (0)	0 (0)	0 (0)

4.9 Access Track Survey

No breeding raptors or waders were confirmed breeding during the two survey visits in 2022, with buzzard and curlew being recorded as follows:

- One buzzard was present near the Bridge of Ryeriggs on both dates. Although there was no indication of breeding, it is likely there was a territory in this area.
- A group of 3 curlew were recorded to the north of the Croft of Ryeriggs on 19th July 2022. Although there was no indication of breeding, this is close to where a displaying curlew was recorded in April 2021. Whilst it is most likely that these birds were commuting through the area, it is also possible that there was a territory in this area.

5.0 Summary of 2021-2022 Survey Data

A range of ornithology surveys was carried out at the proposed Aultmore Wind Farm in 2021 – 2022. These were:

- Flight activity (standard vantage point (VP)) surveys Breeding (March – August 2021; Non-breeding September 2021-February 2022).
- Breeding wader surveys (2021);
- Breeding raptor surveys (2021);
- Black grouse surveys (2021);
- Capercaillie surveys (2021);
- Crested tit surveys (2021);
- Lochan surveys (2021); and
- Access track surveys (2022).

In summary, during the standard flight activity surveys (March – August) eight target species were recorded. Flight activity was at a moderate level, with 67 flights recorded in total, pink-footed goose was the most commonly recorded species with a total of 36 flights. The primary target species listed below were recorded during standard flight activity surveys:

- Pink-footed goose;
- Greylag goose;
- Whooper swan;
- Hen harrier;
- Goshawk;
- Peregrine;
- Osprey; and
- Curlew.

During the standard flight activity surveys (September – February) six target species were recorded. Flight activity was at a moderate level, with 33 flights recorded in total, pink-footed goose was the most commonly recorded species with a total of 9 flights including 1067 individuals. The primary target species listed below were recorded during standard non-breeding season flight activity surveys:

- Pink-footed goose;
- Greylag goose;
- Whooper swan;
- Kestrel;
- Goshawk; and
- Snipe.

Breeding wader surveys recorded the following:

- Curlew: three displaying birds, no confirmed territories;
- Snipe: one bird, no confirmed territories; and

- Lapwing: one bird, no confirmed territories.

Raptors and owls recorded during all surveys included the following:

- Goshawk: no evidence of confirmed breeding, although a pair of birds were displaying in March at south-west of Site;
- Hen harrier: non-breeding, two records in March and April;
- Peregrine: non-breeding, one record in March;
- Osprey: non-breeding, two birds passing through Site in August.

Black grouse surveys found no evidence of black grouse onsite.

Lochan surveys found no evidence of divers, grebes or common scoters onsite.

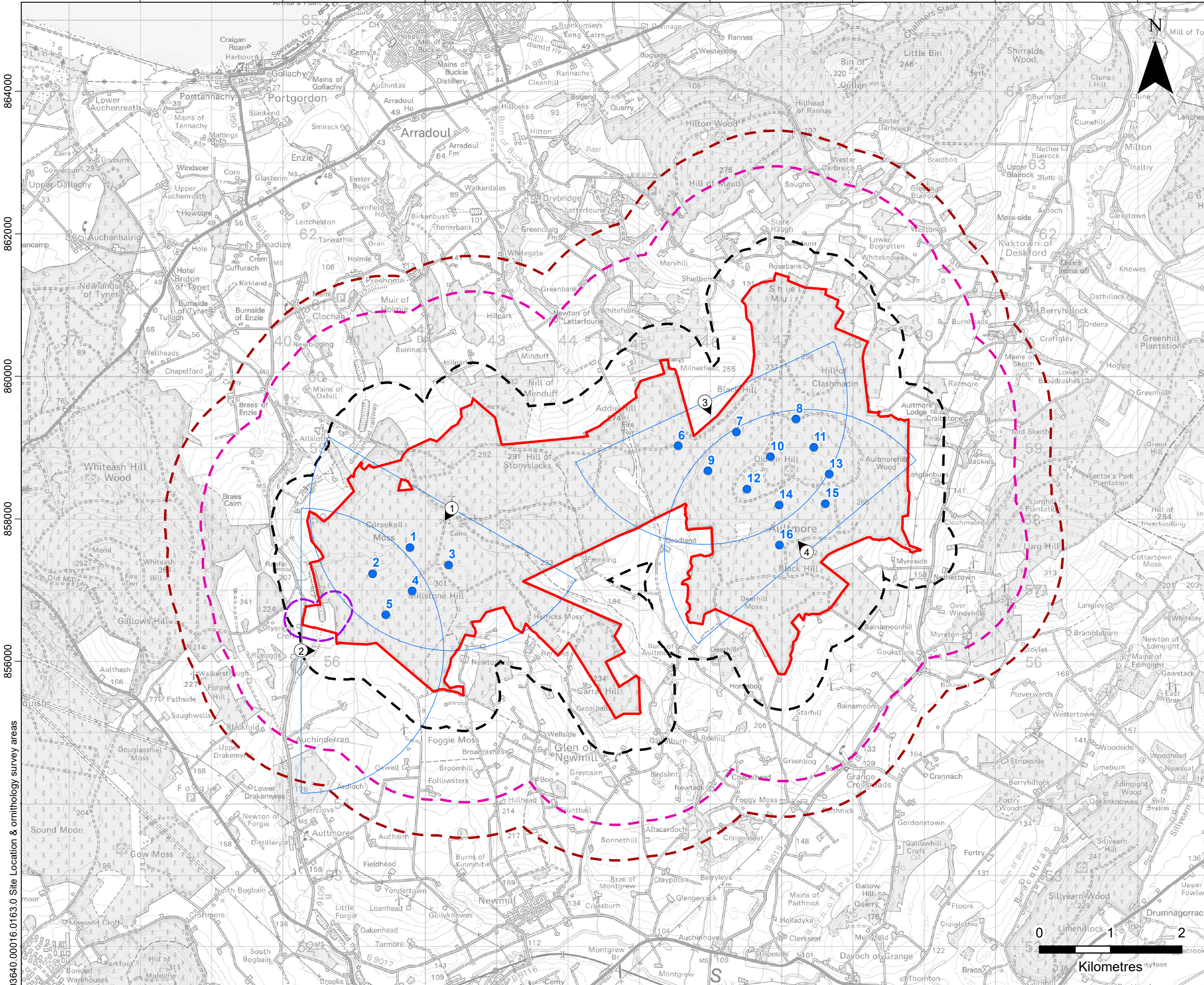
Capercaillie survey found no suitable capercaillie habitat or evidence of presence onsite.

Crested tit survey found no evidence of crested tit onsite.

Access track surveys recorded buzzard and curlew, no confirmed territories (although these were considered likely).

FIGURES

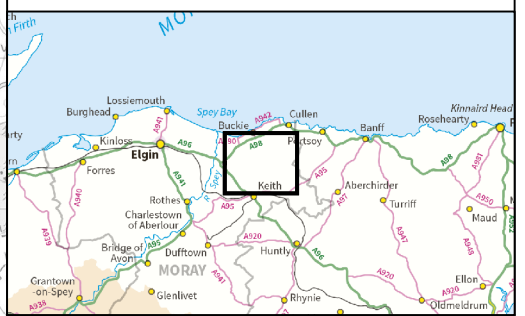
338000 340000 342000 344000 346000 348000 350000 352000



03640.00016.0163.0 Site Location & ornithology survey areas

LEGEND

- Site Boundary
- Turbine Location
- Viewshed Arc 2 km
- Wader Survey Area 2022 - 500 m Site Buffer
- Black Grouse Survey Area 2022 - 1.5 km Site Buffer
- Raptor Survey Area 2022 - 2 km Site Buffer
- Access Track 250 m Buffer



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SITE LOCATION & ORNITHOLOGY SURVEY AREAS

FIGURE 9.1.1

Scale 1:50,000 @ A3 Date NOVEMBER 2023



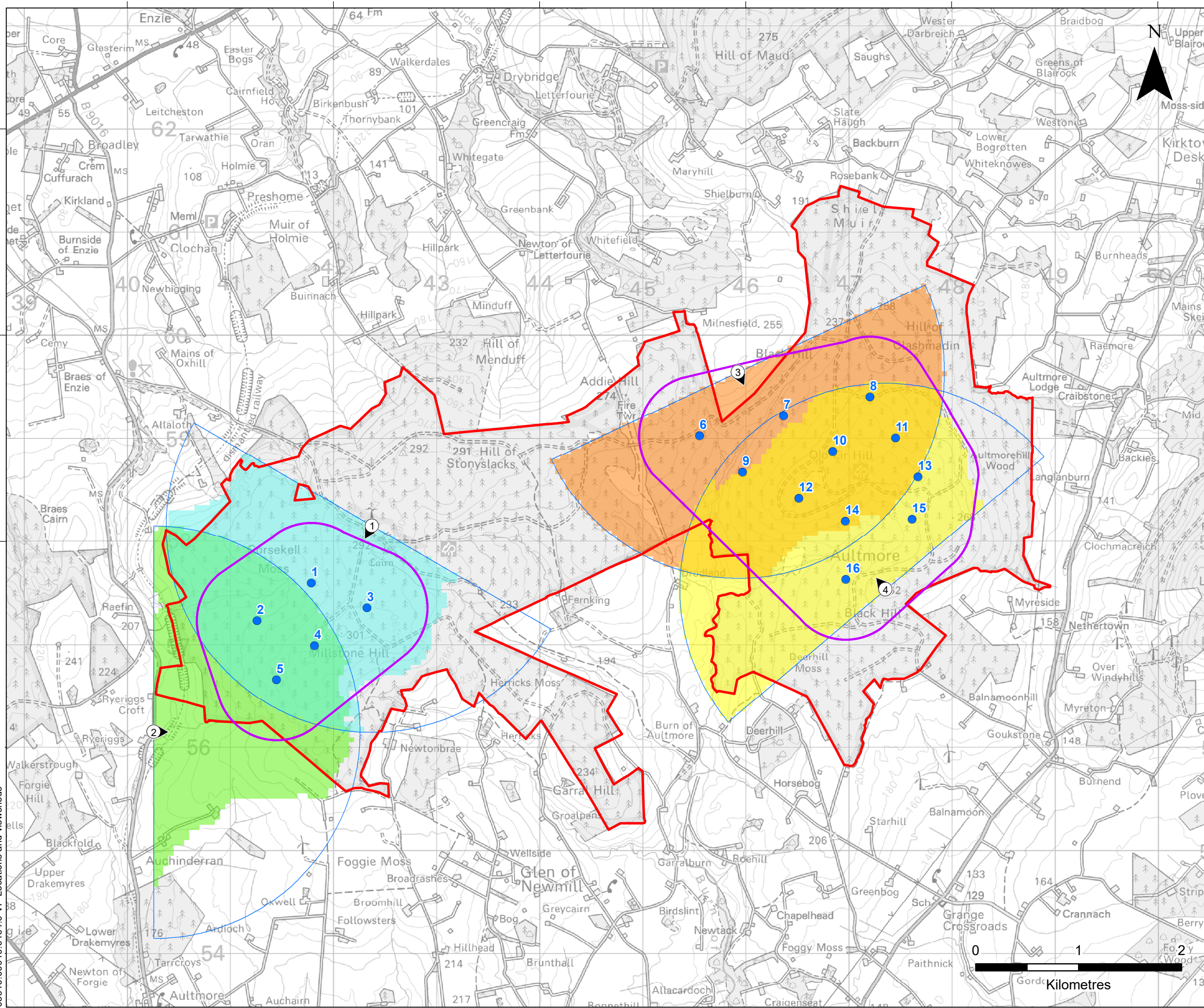
340000 342000 344000 346000 348000 350000

862000

860000

858000

03640.000:0164.0 VP Locations and viewsheds



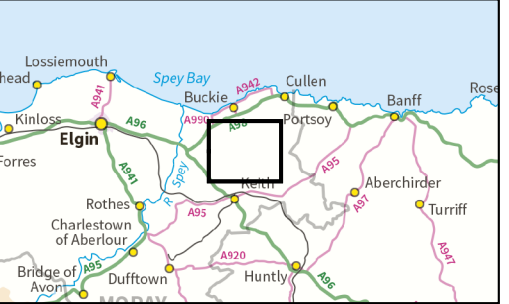
LEGEND

- Site Boundary
- Turbine Location
- Windfarm Polygons - 500m Buffer of the Convex Hull of the Outer Turbine Blades
- Viewpoint Arc 2 km
- Theoretical Visibility from Vantage Point 1
- Theoretical Visibility from Vantage Point 2
- Theoretical Visibility from Vantage Point 3
- Theoretical Visibility from Vantage Point 4

Note

The ZTV is calculated with a surface offset 20m and from a viewing height of 1.8m above ground level. The terrain model is derived from OS Terrain 5 data with a vertical accuracy of ± 5m. The ZTV was calculated using ArcMAP 10.5.1 software

The analysis does not take into account the screening effects of vegetation, buildings or other screening features.



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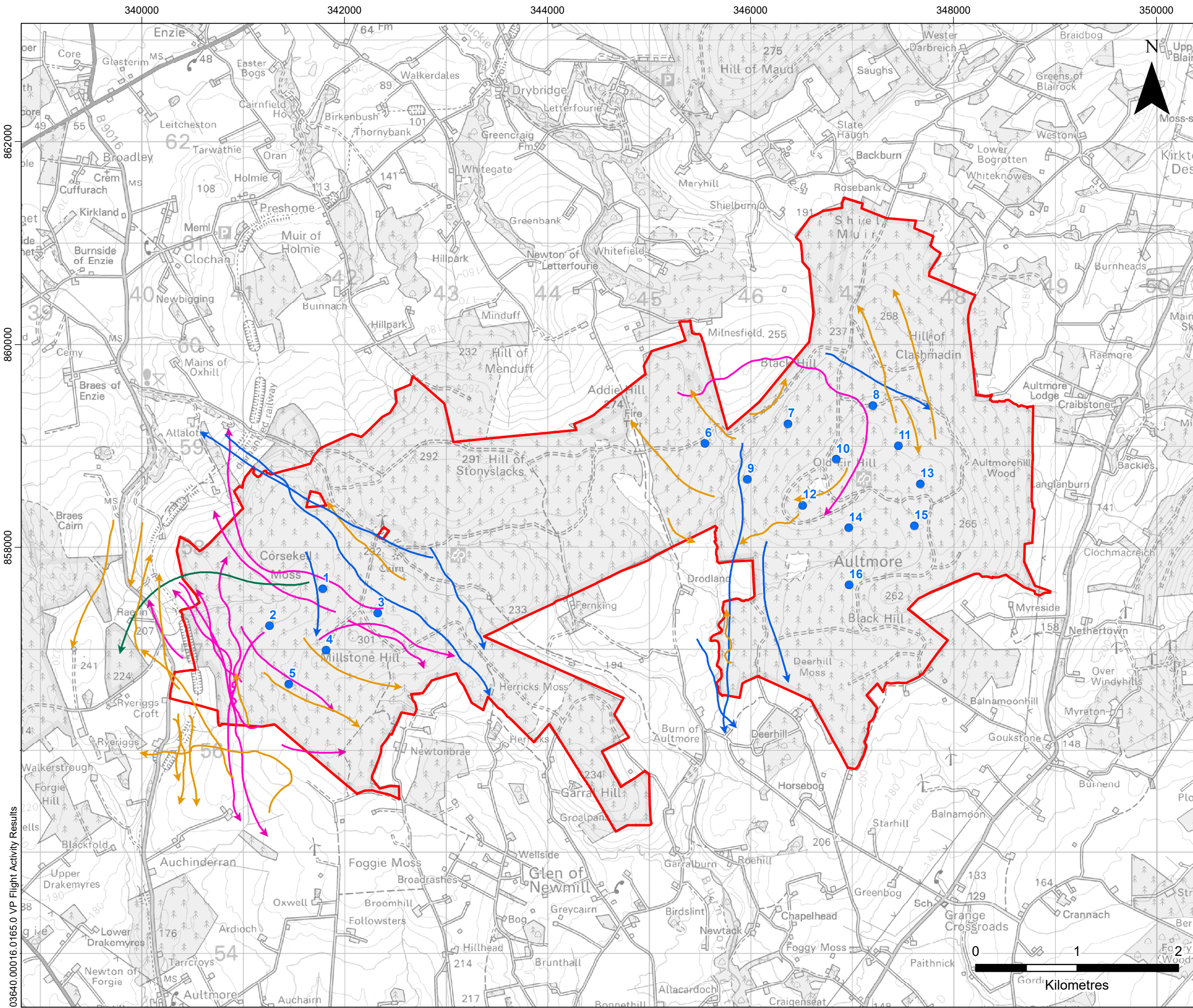
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VANTAGE POINT LOCATIONS AND VIEWSHEDS

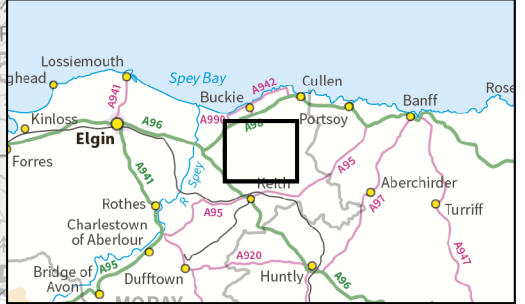
FIGURE 9.1.2

Scale 1:35,000 @ A3 Date OCTOBER 2023



LEGEND

- Site Boundary
- Turbine Location
- Pink Footed Goose Flightline**
- March
- April
- October
- November



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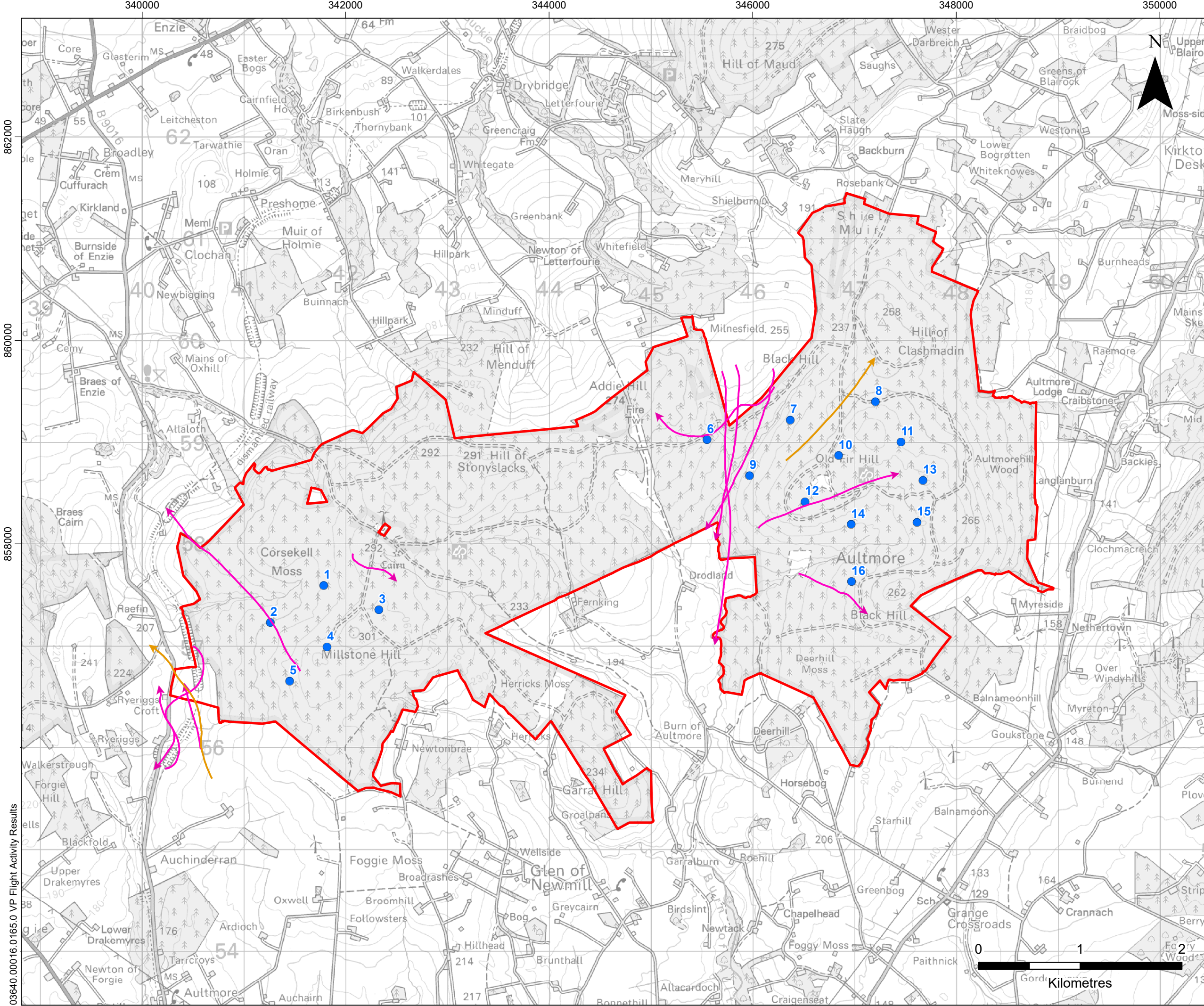
TA 9.1 - ORNITHOLOGY

**FLIGHT ACTIVITY RESULTS:
PINK FOOTED GOOSE**

FIGURE 9.1.3

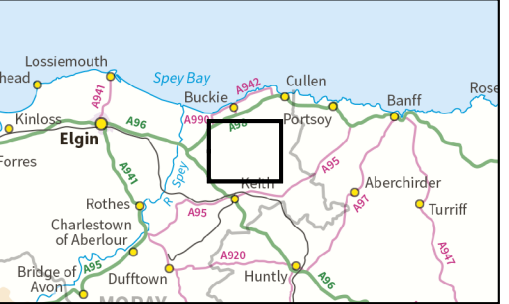
Scale 1:35,000 @ A3 Date OCTOBER 2023

03640.00016.0165.0 VP Flight Activity Results



LEGEND

- Site Boundary
- Turbine Location
- Greylag Goose and Whooper Swan Flightline**
- ➔ Whooper Swan
- ➔ Greylag Goose



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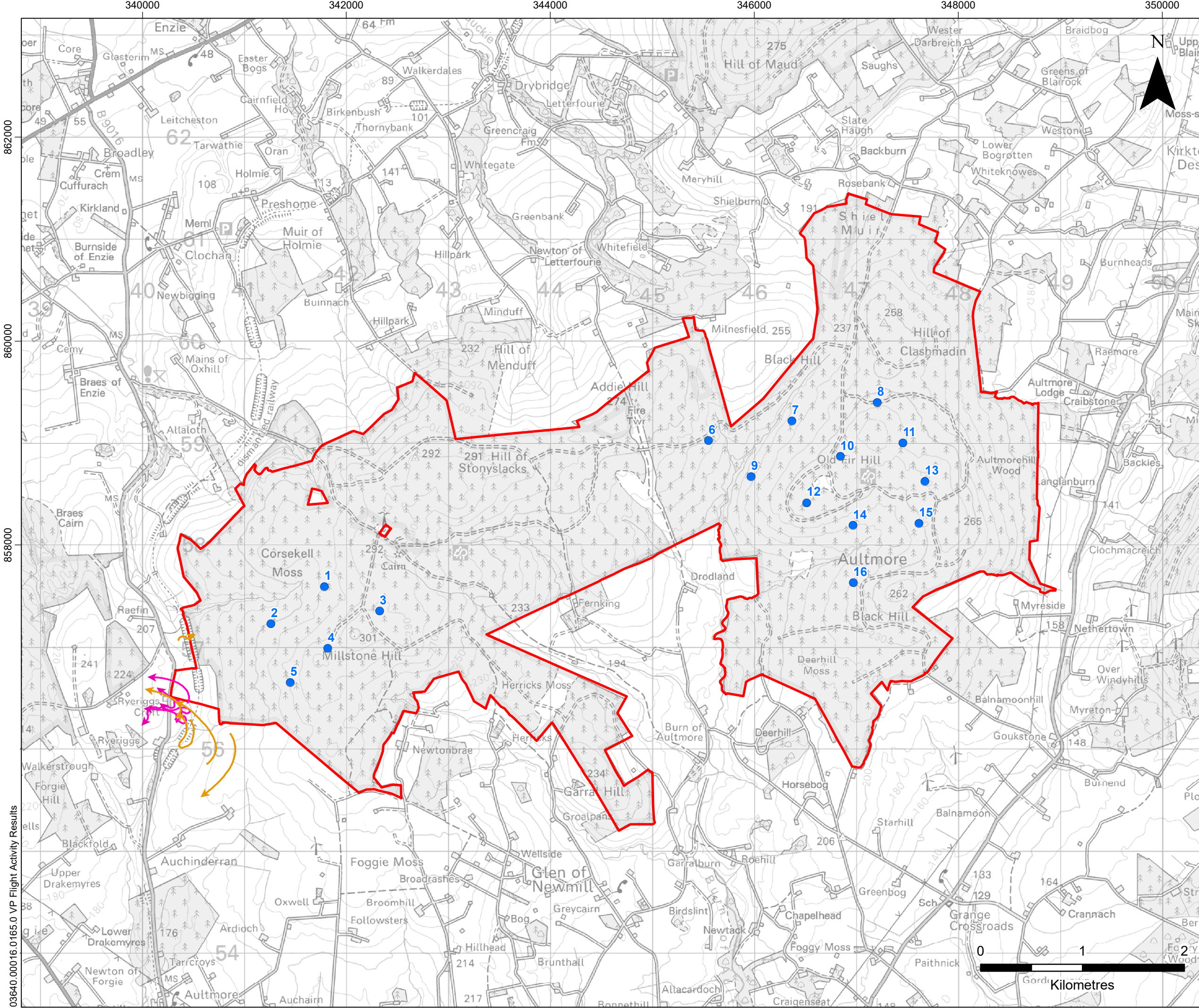
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TA 9.1 - ORNITHOLOGY

**FLIGHT ACTIVITY RESULTS:
GREYLAG GOOSE AND WHOOPER SWAN**

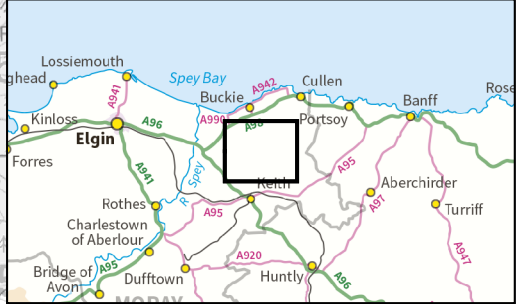
FIGURE 9.1.4

Scale 1:35,000 @ A3 Date OCTOBER 2023



LEGEND

- Site Boundary
- Turbine Location
- Curlew Flightline**
- March
- April



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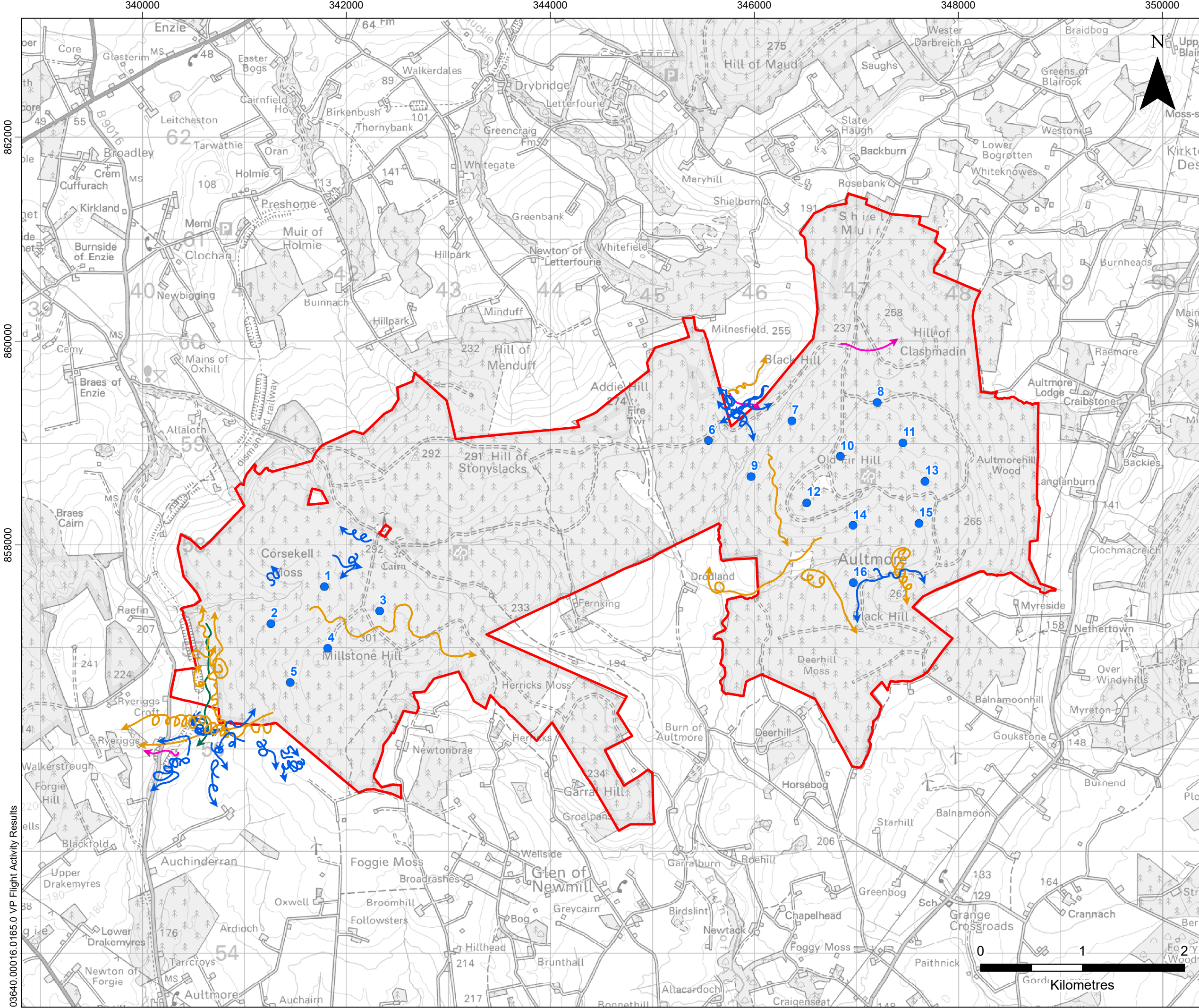
TA 9.1 - ORNITHOLOGY

**FLIGHT ACTIVITY RESULTS:
CURLEW**

FIGURE 9.1.5

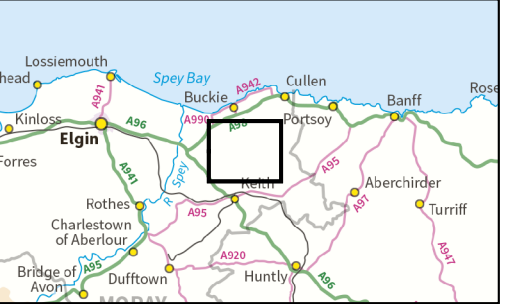
Scale 1:35,000 @ A3 Date OCTOBER 2023

03640.000.16.0.165.0 VP Flight Activity Results



LEGEND

- Site Boundary
- Turbine Location
- Raptors Flightline**
- Goshawk
- Hen Harrier
- Kestrel
- Peregrine



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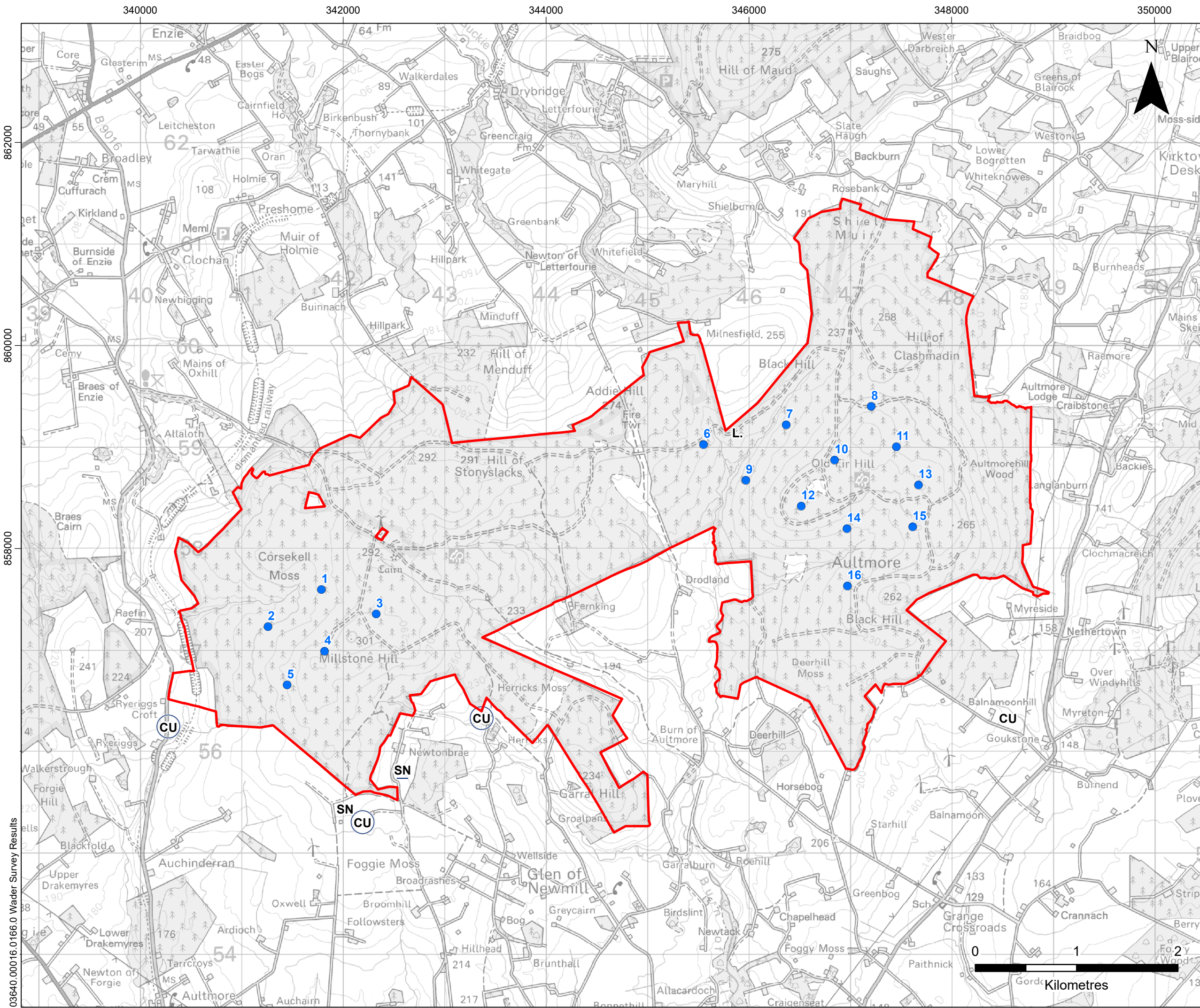
TA 9.1 - ORNITHOLOGY

**FLIGHT ACTIVITY RESULTS:
RAPTORS**

FIGURE 9.1.6

Scale 1:35,000 @ A3 Date OCTOBER 2023

03640.00016.0165.0 VP Flight Activity Results



LEGEND

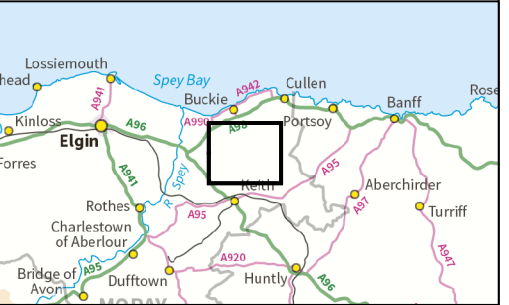
- Site Boundary
- Turbine Location

Bird Activity

- Displaying
- Calling

Bird Species

- CU - Curlew
- L - Lapwing
- SN - Snipe



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WADER SURVEY RESULTS

FIGURE 9.1.7

Scale 1:35,000 @ A3 Date SEPTEMBER 2023

03640.00016.0166.0 Wader Survey Results

APPENDIX 01

Survey Details

Table A1-1
Survey Record, Breeding Season 2021 (end March – August)

Date	SurveyType	VP_code	Survey_ID	Surveyor	SurveyStart (hr:min)	SurveyEnd (hr:min)	SurveyTime (hr:min)
25/03/2021	VP	1	AU21_001	FN	09:28	12:28	03:00
25/03/2021	VP	4	AU21_002	FN	13:15	16:15	03:00
26/03/2021	VP	2	AU21_003	FN	11:55	14:55	03:00
26/03/2021	VP	3	AU21_004	FN	15:45	18:45	03:00
27/03/2021	VP	2	AU21_005	FN	05:40	08:40	03:00
27/03/2021	VP	1	AU21_006	FN	09:10	12:10	03:00
27/03/2021	VP	4	AU21_007	FN	12:40	15:40	03:00
28/03/2021	VP	4	AU21_008	FN	16:40	19:40	03:00
29/03/2021	VP	1	AU21_009	FN	06:30	09:30	03:00
29/03/2021	VP	2	AU21_010	FN	10:00	13:00	03:00
30/03/2021	VP	3	AU21_011	FN	06:30	09:30	03:00
30/03/2021	VP	4	AU21_012	FN	10:00	13:00	03:00
30/03/2021	VP	1	AU21_013	FN	13:30	16:30	03:00
31/03/2021	VP	2	AU21_014	FN	16:10	19:10	03:00
28/03/2021	VP	3	AU21_015	FN	13:10	16:10	03:00
31/03/2021	VP	3	AU21_016	FN	13:45	15:25	01:40
02/04/2021	VP	1	AU21_017	FN	13:25	16:25	03:00
02/04/2021	VP	2	AU21_018	FN	16:55	19:55	03:00
03/04/2021	VP	4	AU21_019	FN	13:15	16:15	03:00
03/04/2021	VP	3	AU21_020	FN	16:45	19:45	03:00

Date	SurveyType	VP_code	Survey_ID	Surveyor	SurveyStart (hr:min)	SurveyEnd (hr:min)	SurveyTime (hr:min)
04/04/2021	VP	1	AU21_021	FN	06:15	09:15	03:00
04/04/2021	VP	2	AU21_022	FN	09:45	12:45	03:00
07/04/2021	VP	3	AU21_023	FN	13:35	16:35	03:00
07/04/2021	VP	4	AU21_024	FN	17:05	20:05	03:00
08/04/2021	VP	2	AU21_025	FN	06:00	09:00	03:00
08/04/2021	VP	1	AU21_026	FN	09:30	12:30	03:00
12/04/2021	Raptor/wader		AU21_027	AB	06:45	15:45	09:00
17/04/2021	VP	3	AU21_028	FN	13:55	16:55	03:00
17/04/2021	VP	4	AU21_029	FN	17:25	20:25	03:00
19/04/2021	BK/CP/CI		AU21_030	AB	05:20	13:30	08:10
21/04/2021	BK/CP/CI		AU21_031	AB	05:15	13:15	08:00
22/04/2021	Wader		AU21_032	AB	06:15	15:15	09:00
22/04/2021	VP	4	AU21_033	FN	14:05	17:05	03:00
22/04/2021	VP	3	AU21_034	FN	17:35	20:35	03:00
25/04/2021	VP	3	AU21_035	FN	09:35	12:35	03:00
25/04/2021	VP	1	AU21_036	FN	13:05	16:05	03:00
25/04/2021	VP	2	AU21_037	FN	16:35	19:35	03:00
02/05/2021	VP	1	AU21_038	FN	11:25	14:25	03:00
02/05/2021	VP	2	AU21_039	FN	14:55	17:55	03:00
09/05/2021	Raptor/wader		AU21_040	FN	09:30	15:30	06:00
13/05/2021	VP	4	AU21_041	FN	13:20	16:20	03:00
13/05/2021	VP	3	AU21_042	FN	16:50	19:50	03:00
16/05/2021	BK		AU21_043	FN	03:30	06:30	03:00

Date	SurveyType	VP_code	Survey_ID	Surveyor	SurveyStart (hr:min)	SurveyEnd (hr:min)	SurveyTime (hr:min)
16/05/2021	Raptor/wader		AU21_044	FN	06:30	09:30	03:00
16/05/2021	VP	1	AU21_045	FN	09:45	12:45	03:00
19/05/2021	BK		AU21_046	FN	03:20	06:20	03:00
19/05/2021	VP	4	AU21_047	FN	06:20	09:20	03:00
19/05/2021	Raptor/wader		AU21_048	FN	09:50	12:50	03:00
22/05/2021	VP	2	AU21_049	FN	07:15	10:15	03:00
22/05/2021	Raptor/wader		AU21_050	FN	10:15	13:15	03:00
28/05/2021	Raptor/wader		AU21_051	FN	10:15	13:15	03:00
28/05/2021	VP	3	AU21_052	FN	13:15	16:15	03:00
03/06/2021	Raptor/wader		AU21_053	FN	12:20	15:20	03:00
03/06/2021	VP	4	AU21_054	FN	15:20	18:20	03:00
04/06/2021	VP	1	AU21_055	FN	08:10	11:10	03:00
04/06/2021	Raptor/lochans		AU21_056	FN	11:10	14:10	03:00
13/06/2021	VP	2	AU21_057	FN	07:45	10:45	03:00
13/06/2021	Raptor		AU21_058	FN	11:00	14:00	03:00
18/06/2021	VP	3	AU21_059	FN	11:30	14:30	03:00
18/06/2021	Raptor		AU21_060	FN	14:30	17:30	03:00
22/06/2021	VP	1	AU21_061	FN	08:00	11:00	03:00
22/06/2021	Raptor/wader		AU21_062	FN	11:00	14:00	03:00
22/06/2021	VP	2	AU21_063	FN	14:15	17:15	03:00
23/06/2021	VP	3	AU21_064	FN	11:00	14:00	03:00
23/06/2021	Raptor/wader		AU21_065	FN	14:00	17:00	03:00
23/06/2021	VP	4	AU21_066	FN	17:00	20:00	03:00

Date	SurveyType	VP_code	Survey_ID	Surveyor	SurveyStart (hr:min)	SurveyEnd (hr:min)	SurveyTime (hr:min)
04/07/2021	Raptor/Wader		AU21_067	FN	12:00	15:00	03:00
04/07/2021	VP	1	AU21_068	FN	15:00	18:00	03:00
05/07/2021	VP	4	AU21_069	FN	10:25	13:25	03:00
18/07/2021	Raptor/Wader		AU21_070	FN	16:40	19:40	03:00
18/07/2021	VP	2	AU21_071	FN	13:40	16:40	03:00
19/07/2021	Raptor/Wader		AU21_072	FN	11:10	14:10	03:00
19/07/2021	VP	3	AU21_073	FN	08:10	11:10	03:00
20/07/2021	Raptor/Wader		AU21_074	FN	09:00	12:00	03:00
29/07/2021	VP	4	AU21_075	FN	09:00	12:00	03:00
29/07/2021	Raptor/Wader		AU21_076	FN	12:00	15:00	03:00
29/07/2021	VP	2	AU21_077	FN	15:00	18:00	03:00
30/07/2021	VP	3	AU21_078	FN	07:45	10:45	03:00
30/07/2021	Raptor/Wader		AU21_079	FN	10:45	13:45	03:00
30/07/2021	VP	1	AU21_080	FN	13:45	16:45	03:00
14/08/2021	VP	2	AU21_081	JM	10:00	13:00	03:00
14/08/2021	VP	1	AU21_082	JM	13:30	16:30	03:00
14/08/2021	VP	1	AU21_083	JM	17:00	20:00	03:00
15/08/2021	VP	3	AU21_084	JM	07:00	10:00	03:00
15/08/2021	VP	3	AU21_085	JM	10:30	13:30	03:00
15/08/2021	VP	4	AU21_086	JM	14:15	17:15	03:00
16/08/2021	VP	4	AU21_087	JM	05:15	08:15	03:00
16/08/2021	VP	2	AU21_088	JM	08:45	11:45	03:00

Table A1-2
Survey Record, Non-breeding Season 2021/22 (Sept - Feb)

Date	SurveyType	VP_code	Survey_ID	Surveyor	SurveyStart (hr:min)	SurveyEnd (hr:min)	SurveyTime (hr:min)
06/09/2021	VP	2	AU21_089	JM	13:30	16:30	03:00
06/09/2021	VP	2	AU21_090	JM	17:00	20:00	03:00
07/09/2021	VP	1	AU21_091	JM	06:00	09:00	03:00
07/09/2021	VP	1	AU21_092	JM	09:30	12:30	03:00
09/09/2021	VP	3	AU21_093	JM	12:15	15:15	03:00
09/09/2021	VP	3	AU21_094	JM	15:45	17:45	02:00
10/09/2021	VP	4	AU21_095	JM	06:00	09:00	03:00
10/09/2021	VP	4	AU21_096	JM	09:30	12:30	03:00
10/09/2021	VP	3	AU21_097	JM	13:00	14:00	01:00
22/09/2021	VP	4	AU21_098	FN	07:45	10:45	03:00
26/09/2021	VP	1	AU21_099	JM	12:15	15:15	03:00
26/09/2021	VP	1	AU21_100	JM	15:45	18:45	03:00
27/09/2021	VP	2	AU21_101	JM	06:45	09:45	03:00
27/09/2021	VP	2	AU21_102	JM	10:15	13:15	03:00
28/09/2021	VP	3	AU21_103	FN	07:30	10:30	03:00
28/09/2021	VP	3	AU21_104	FN	11:00	14:00	03:00

Date	SurveyType	VP_code	Survey_ID	Surveyor	SurveyStart (hr:min)	SurveyEnd (hr:min)	SurveyTime (hr:min)
28/09/2021	VP	4	AU21_105	FN	14:30	17:30	03:00
04/10/2021	VP	1	AU21_106	JM	10:00	13:00	03:00
04/10/2021	VP	2	AU21_107	JM	13:30	16:30	03:00
05/10/2021	VP	2	AU21_108	JM	15:30	18:30	03:00
06/10/2021	VP	1	AU21_109	JM	06:50	09:50	03:00
06/10/2021	VP	4	AU21_110	JM	10:30	13:30	03:00
06/10/2021	VP	4	AU21_111	JM	14:00	17:00	03:00
07/10/2021	VP	3	AU21_112	JM	10:45	13:45	03:00
08/10/2021	VP	3	AU21_113	JM	07:15	10:15	03:00
11/10/2021	VP	3	AU21_114	PS	11:10	14:10	03:00
11/10/2021	VP	3	AU21_115	PS	14:40	17:40	03:00
12/10/2021	VP	4	AU21_116	PS	07:30	10:30	03:00
12/10/2021	VP	4	AU21_117	PS	11:00	14:00	03:00
12/10/2021	VP	1	AU21_118	PS	15:00	18:00	03:00
13/10/2021	VP	1	AU21_119	PS	08:00	11:00	03:00
13/10/2021	VP	2	AU21_120	PS	11:30	14:30	03:00
13/10/2021	VP	2	AU21_121	PS	15:00	18:00	03:00
05/11/2021	VP	1	AU21_122	JM	12:00	15:00	03:00

Date	SurveyType	VP_code	Survey_ID	Surveyor	SurveyStart (hr:min)	SurveyEnd (hr:min)	SurveyTime (hr:min)
05/11/2021	VP	1	AU21_123	JM	15:30	16:30	01:00
07/11/2021	VP	2	AU21_124	JM	07:30	10:30	03:00
07/11/2021	VP	2	AU21_125	JM	11:00	14:30	03:30
07/11/2021	VP	1	AU21_126	JM	14:30	16:30	02:00
21/11/2021	VP	4	AU21_127	JM	09:15	12:15	03:00
21/11/2021	VP	3	AU21_128	JM	12:55	15:55	03:00
22/11/2021	VP	3	AU21_129	JM	07:40	10:40	03:00
22/11/2021	VP	4	AU21_130	JM	11:20	14:20	03:00
15/12/2021	VP	1	AU21_131	JM	09:00	12:00	03:00
15/12/2021	VP	2	AU21_132	JM	12:30	15:30	03:00
16/12/2021	VP	4	AU21_133	JM	08:30	11:30	03:00
16/12/2021	VP	3	AU21_134	JM	12:15	15:15	03:00
22/12/2021	VP	4	AU21_135	JM	08:30	11:30	03:00
22/12/2021	VP	3	AU21_136	JM	12:15	15:15	03:00
24/12/2021	VP	1	AU21_137	JM	08:30	11:30	03:00
24/12/2021	VP	2	AU21_138	JM	12:00	15:00	03:00
06/01/2022	VP	3	AU21_139	JM	09:00	12:00	03:00
06/01/2022	VP	4	AU21_140	JM	12:45	15:45	03:00

Date	SurveyType	VP_code	Survey_ID	Surveyor	SurveyStart (hr:min)	SurveyEnd (hr:min)	SurveyTime (hr:min)
07/01/2022	VP	4	AU21_141	JM	09:00	12:00	03:00
07/01/2022	VP	3	AU21_142	JM	12:40	15:40	03:00
18/01/2022	VP	1	AU21_143	PS	09:45	12:45	03:00
18/01/2022	VP	1	AU21_144	PS	13:15	16:15	03:00
19/01/2022	VP	2	AU21_145	PS	09:10	12:10	03:00
19/01/2022	VP	2	AU21_146	PS	12:40	15:40	03:00
01/02/2022	VP	2	AU21_147	JM	08:00	11:00	03:00
01/02/2022	VP	1	AU21_148	JM	11:30	14:30	03:00
14/02/2022	VP	1	AU21_149	JM	09:15	12:15	03:00
14/02/2022	VP	2	AU21_150	JM	12:45	15:45	03:00
22/02/2022	VP	3	AU21_151	BW	11:10	14:10	03:00
22/02/2022	VP	3	AU21_152	BW	14:40	17:40	03:00
23/02/2022	VP	4	AU21_153	BW	08:30	11:30	03:00
23/02/2022	VP	4	AU21_154	BW	12:00	15:00	03:00

Table A1-3
Weather Data Mar- Aug 22¹⁷

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
25/03/2021	09:28	12:28	AU21_001	1	3	S	0	5	2	2	0	0	10
25/03/2021	09:28	12:28	AU21_001	2	2	S	0	3	2	2	0	0	12
25/03/2021	09:28	12:28	AU21_001	3	3	S	0	4	2	2	0	0	12
25/03/2021	13:15	16:15	AU21_002	1	3	S	0	7	2	2	0	0	12
25/03/2021	13:15	16:15	AU21_002	2	3	S	0	8	2	2	0	0	12
25/03/2021	13:15	16:15	AU21_002	3	3	S	0	8	2	2	0	0	10
26/03/2021	11:55	14:55	AU21_003	1	2	SW	2	4	2	2	0	0	6
26/03/2021	11:55	14:55	AU21_003	2	3	W	2	4	2	2	0	0	8
26/03/2021	11:55	14:55	AU21_003	3	2	W	0	4	2	2	0	0	8
26/03/2021	15:45	18:45	AU21_004	1	3	SW	0	4	2	2	0	0	5
26/03/2021	15:45	18:45	AU21_004	2	3	S	0	4	2	2	0	0	4
26/03/2021	15:45	18:45	AU21_004	3	2	SW	0	3	2	2	0	0	4
27/03/2021	05:40	08:40	AU21_005	1	1	S	0	0		2	0	0	1.5
27/03/2021	05:40	08:40	AU21_005	2	1	S	0	1	2	2	0	0	2
27/03/2021	05:40	08:40	AU21_005	3	1	S	0	0		2	0	0	1
27/03/2021	09:10	12:10	AU21_006	1	3	SW	0	4	2	2	0	0	4
27/03/2021	09:10	12:10	AU21_006	2	3	SW	0	5	2	2	0	0	3.5
27/03/2021	09:10	12:10	AU21_006	3	3	W	0	6	2	2	0	0	3.5
27/03/2021	12:40	15:40	AU21_007	1	2	SW	0	7	2	2	0	0	7

¹⁷ For key of codes , see end of Table A1-4

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
27/03/2021	12:40	15:40	AU21_007	2	2	SW	0	8	2	2	0	0	7
27/03/2021	12:40	15:40	AU21_007	3	2	SW	0	8	2	2	0	0	6
28/03/2021	16:40	19:40	AU21_008	1	2	S	1	8	2	2	0	0	9
28/03/2021	16:40	19:40	AU21_008	2	1	S	1	8	2	2	0	0	8
28/03/2021	16:40	19:40	AU21_008	3	1	S	0	8	2	2	0	0	8
29/03/2021	06:30	09:30	AU21_009	1	4	SW	0	2	2	2	0	0	12
29/03/2021	06:30	09:30	AU21_009	2	3	W	0	2	2	2	0	0	11
29/03/2021	06:30	09:30	AU21_009	3	3	W	0	7	2	2	0	0	11
29/03/2021	10:00	13:00	AU21_010	1	3	SW	0	7	2	2	0	0	14
29/03/2021	10:00	13:00	AU21_010	2	2	W	0	6	2	2	0	0	14
29/03/2021	10:00	13:00	AU21_010	3	2	W	0	7	2	2	0	0	14
30/03/2021	06:30	09:30	AU21_011	1	4	SW	0	2	2	2	0	0	12
30/03/2021	06:30	09:30	AU21_011	2	3	S	0	7	2	2	0	0	12
30/03/2021	06:30	09:30	AU21_011	3	3	S	0	7	2	2	0	0	12
30/03/2021	10:00	13:00	AU21_012	1	3	SW	0	6	2	2	0	0	11
30/03/2021	10:00	13:00	AU21_012	2	3	SW	0	5	2	2	0	0	12
30/03/2021	10:00	13:00	AU21_012	3	3	SW	0	6	2	2	0	0	12
30/03/2021	13:30	16:30	AU21_013	1	3	S	0	7	2	2	0	0	13
30/03/2021	13:30	16:30	AU21_013	2	4	W	0	7	2	2	0	0	13
30/03/2021	13:30	16:30	AU21_013	3	4	S	0	7	2	2	0	0	13
31/03/2021	16:10	19:10	AU21_014	1	2	NE	3	8	1	1	0	0	5
31/03/2021	16:10	19:10	AU21_014	2	2	NE	2	8	1	1	0	0	4
31/03/2021	16:10	19:10	AU21_014	3	2	NE	3	8	1	1	0	0	3

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
28/03/2021	13:10	16:10	AU21_015	1	4	S	0	5	2	2	0	0	11
28/03/2021	13:10	16:10	AU21_015	2	3	SW	0	8	2	2	0	0	10
28/03/2021	13:10	16:10	AU21_015	3	3	SW	0	8	2	2	0	0	10
31/03/2021	13:45	15:25	AU21_016	1	3	NE	4	8	0	0	0	0	6
31/03/2021	13:45	15:25	AU21_016	2	3	NE	4	8	0	0	0	0	5
02/04/2021	13:25	16:25	AU21_017	1	1	NE	0	2	2	2	0	0	10
02/04/2021	13:25	16:25	AU21_017	2	1	NE	0	1	2	2	0	0	12
02/04/2021	13:25	16:25	AU21_017	3	1	NE	0	1	2	2	0	0	12
02/04/2021	16:55	19:55	AU21_018	1	1	NW	0	1	2	2	0	0	8
02/04/2021	16:55	19:55	AU21_018	2	2	NW	0	1	2	2	0	0	7
02/04/2021	16:55	19:55	AU21_018	3	1	NE	0	1	2	2	0	0	5
03/04/2021	13:15	16:15	AU21_019	1	1	NE	0	0		2	0	0	12
03/04/2021	13:15	16:15	AU21_019	2	1	N	0	0		2	0	0	10
03/04/2021	13:15	16:15	AU21_019	3	2	N	0	0		2	0	0	10
03/04/2021	16:45	19:45	AU21_020	1	1	NW	0	0		2	0	0	8
03/04/2021	16:45	19:45	AU21_020	2	1	NW	0	0		2	0	0	7
03/04/2021	16:45	19:45	AU21_020	3	1	NW	0	0		2	0	0	5
04/04/2021	06:15	09:15	AU21_021	1	3	W	0	3	2	2	0	0	3
04/04/2021	06:15	09:15	AU21_021	2	4	NW	0	6	2	2	0	0	4.5
04/04/2021	06:15	09:15	AU21_021	3	4	NW	0	8	2	2	0	0	4.5
04/04/2021	09:45	12:45	AU21_022	1	4	W	0	6	2	2	0	0	6.5
04/04/2021	09:45	12:45	AU21_022	2	4	NW	0	7	2	2	0	0	6.5
04/04/2021	09:45	12:45	AU21_022	3	5	NW	0	8	2	2	0	0	6.5

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
07/04/2021	13:35	16:35	AU21_023	1	3	N	3	8	2	1	1	0	1
07/04/2021	13:35	16:35	AU21_023	2	3	N	0	6	2	2	1	0	1
07/04/2021	13:35	16:35	AU21_023	3	2	N	0	5	2	2	1	0	1
07/04/2021	17:05	20:05	AU21_024	1	1	NW	0	8	2	2	1	0	1
07/04/2021	17:05	20:05	AU21_024	2	1	NW	2	7	2	2	1	0	1
07/04/2021	17:05	20:05	AU21_024	3	1	NW	0	6	2	2	1	0	3
08/04/2021	06:00	09:00	AU21_025	1	3	W	0	3	2	2	2	0	3
08/04/2021	06:00	09:00	AU21_025	2	4	NW	0	2	2	2	2	0	3
08/04/2021	06:00	09:00	AU21_025	3	3	W	0	1	2	2	2	0	4
08/04/2021	09:30	12:30	AU21_026	1	3	SW	0	3	2	2	2	0	7
08/04/2021	09:30	12:30	AU21_026	2	4	S	0	7	2	2	2	0	7
08/04/2021	09:30	12:30	AU21_026	3	4	SW	0	5	2	2	2	0	9
12/04/2021	06:45	15:45	AU21_027	1	1	N	0	1	2	2	2	1	-2
12/04/2021	06:45	15:45	AU21_027	2	1	N	0	1	2	2	2	1	-1
12/04/2021	06:45	15:45	AU21_027	3	2	N	0	0		2	2	1	1
12/04/2021	06:45	15:45	AU21_027	4	2	N	0	0		2	2	1	1
12/04/2021	06:45	15:45	AU21_027	5	2	N	0	7	2	2	2	1	2
12/04/2021	06:45	15:45	AU21_027	6	3	N	0	4	2	2	2	0	3
12/04/2021	06:45	15:45	AU21_027	7	3	N	0	4	2	2	2	0	5
12/04/2021	06:45	15:45	AU21_027	8	3	N	0	4	2	2	2	0	7
12/04/2021	06:45	15:45	AU21_027	9	2	N	0	4	2	2	2	0	7
17/04/2021	13:55	16:55	AU21_028	1	2	S	0	1	2	2	0	0	10
17/04/2021	13:55	16:55	AU21_028	2	2	S	0	1	2	2	0	0	11

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
17/04/2021	13:55	16:55	AU21_028	3	2	S	0	1	2	2	0	0	10
17/04/2021	17:25	20:25	AU21_029	1	1	S	0	1	2	2	0	0	13
17/04/2021	17:25	20:25	AU21_029	2	1	S	0	1	2	2	0	0	12
17/04/2021	17:25	20:25	AU21_029	3	1	S	0	1	2	2	0	0	12
19/04/2021	05:20	13:30	AU21_030	1	0		0	8	2	2	0	0	6
19/04/2021	05:20	13:30	AU21_030	2	0		0	8	2	2	0	0	6
19/04/2021	05:20	13:30	AU21_030	3	1	S	0	7	2	2	0	0	6
19/04/2021	05:20	13:30	AU21_030	4	2	S	0	7	2	2	0	0	7
19/04/2021	05:20	13:30	AU21_030	5	1	S	0	7	2	2	0	0	8
19/04/2021	05:20	13:30	AU21_030	6	1	S	0	7	2	2	0	0	8
19/04/2021	05:20	13:30	AU21_030	7	2	S	0	7	2	2	0	0	6
19/04/2021	05:20	13:30	AU21_030	8	2	S	0	6	2	2	0	0	8
21/04/2021	05:15	13:15	AU21_031	1	1	S	0	3	2	2	0	0	1
21/04/2021	05:15	13:15	AU21_031	2	1	S	0	4	2	2	0	0	2
21/04/2021	05:15	13:15	AU21_031	3	1	S	0	3	2	2	0	0	3
21/04/2021	05:15	13:15	AU21_031	4	1	S	0	3	2	2	0	0	4
21/04/2021	05:15	13:15	AU21_031	5	1	S	0	3	2	2	0	0	6
21/04/2021	05:15	13:15	AU21_031	6	1	S	0	3	2	2	0	0	8
21/04/2021	05:15	13:15	AU21_031	7	0		0	2	2	2	0	0	6
21/04/2021	05:15	13:15	AU21_031	8	0		0	2	2	2	0	0	6
22/04/2021	06:15	15:15	AU21_031	1	0		0	1	2	2	0	1	-2
22/04/2021	06:15	15:15	AU21_031	2	1	W	0	1	2	2	0	1	0
22/04/2021	06:15	15:15	AU21_031	3	1	W	0	1	2	2	0	0	2

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
22/04/2021	06:15	15:15	AU21_031	4	1	W	0	0	2	2	0	0	5
22/04/2021	06:15	15:15	AU21_031	5	1	W	0	1	2	2	0	0	8
22/04/2021	06:15	15:15	AU21_031	6	1	W	0	0	2	2	0	0	9
22/04/2021	06:15	15:15	AU21_031	7	1	W	0	1	2	2	0	0	10
22/04/2021	06:15	15:15	AU21_031	8	0		0	1	2	2	0	0	10
22/04/2021	06:15	15:15	AU21_031	9	0		0	0	2	2	0	0	13
22/04/2021	14:05	17:05	AU21_032	1	2	NW	0	2	2	2	0	0	13
22/04/2021	14:05	17:05	AU21_032	2	2	NW	0	8	2	2	0	0	12
22/04/2021	14:05	17:05	AU21_032	3	1	NW	0	8	2	2	0	0	12
22/04/2021	17:35	20:35	AU21_034	1	1	N	0	8	2	2	0	0	10
22/04/2021	17:35	20:35	AU21_034	2	0		0	8	2	2	0	0	10
22/04/2021	17:35	20:35	AU21_034	3	0		0	7	2	2	0	0	9
25/04/2021	09:35	12:35	AU21_035	1	2	SE	0	1	2	2	0	0	9
25/04/2021	09:35	12:35	AU21_035	2	1	S	0	0		2	0	0	11
25/04/2021	09:35	12:35	AU21_035	3	1	S	0	1	2	2	0	0	13
25/04/2021	13:05	16:05	AU21_036	1	2	S	0	1	2	2	0	0	14
25/04/2021	13:05	16:05	AU21_036	2	2	S	0	0		2	0	0	13
25/04/2021	13:05	16:05	AU21_036	3	1	SE	0	1	2	2	0	0	13
25/04/2021	16:35	19:35	AU21_037	1	2	SE	0	0		2	0	0	14
25/04/2021	16:35	19:35	AU21_037	2	2	SE	0	0		2	0	0	12
25/04/2021	16:35	19:35	AU21_037	3	1	SE	0	0		2	0	0	13
02/05/2021	11:25	14:25	AU21_038	1	1	N	2	8	2	2	0	0	7
02/05/2021	11:25	14:25	AU21_038	2	1	N	0	7	2	2	0	0	8

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
02/05/2021	11:25	14:25	AU21_038	3	1	N	0	6	2	2	0	0	8
02/05/2021	14:55	17:55	AU21_039	1	1	NW	0	3	2	2	0	0	8
02/05/2021	14:55	17:55	AU21_039	2	1	NW	0	5	2	2	0	0	7
02/05/2021	14:55	17:55	AU21_039	3	1	N	0	6	2	2	0	0	7
09/05/2021	09:30	15:30	AU21_040	1	2	NE	0	8	2	2	0	0	8
09/05/2021	09:30	15:30	AU21_040	2	2	NE	0	8	2	2	0	0	8
09/05/2021	09:30	15:30	AU21_040	3	2	N	0	7	2	2	0	0	9
09/05/2021	09:30	15:30	AU21_040	4	1	NE	0	7	2	2	0	0	10
09/05/2021	09:30	15:30	AU21_040	5	2	NE	0	8	2	2	0	0	11
09/05/2021	09:30	15:30	AU21_040	6	2	NE	0	7	2	2	0	0	11
13/05/2021	13:20	16:20	AU21_041	1	3	NE	0	8	2	2	0	0	9
13/05/2021	13:20	16:20	AU21_041	2	2	N	0	8	2	2	0	0	10
13/05/2021	13:20	16:20	AU21_041	3	3	N	0	8	2	2	0	0	10
13/05/2021	16:50	19:50	AU21_042	1	3	N	1	8	2	2	0	0	9
13/05/2021	16:50	19:50	AU21_042	2	3	NE	0	7	2	2	0	0	8
13/05/2021	16:50	19:50	AU21_042	3	3	NE	0	7	2	2	0	0	8
16/05/2021	03:30	06:30	AU21_043	1	1	N	0	3	2	2	0	0	5
16/05/2021	03:30	06:30	AU21_043	2	1	N	0	2	2	2	0	0	6
16/05/2021	03:30	06:30	AU21_043	3	1	N	0	2	2	2	0	0	6
16/05/2021	06:30	09:30	AU21_044	1	1	N	0	2	2	2	0	0	6
16/05/2021	06:30	09:30	AU21_044	2	1	N	0	2	2	2	0	0	7
16/05/2021	06:30	09:30	AU21_044	3	1	N	0	2	2	2	0	0	7
16/05/2021	09:45	12:45	AU21_045	1	1	N	0	2	2	2	0	0	10

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
16/05/2021	09:45	12:45	AU21_045	2	1	N	0	3	2	2	0	0	12
16/05/2021	09:45	12:45	AU21_045	3	1	N	0	3	2	2	0	0	13
19/05/2021	03:20	06:20	AU21_046	1	1	NE	0	8	2	2	0	0	2
19/05/2021	03:20	06:20	AU21_046	2	1	NE	0	8	2	2	0	0	4
19/05/2021	03:20	06:20	AU21_046	3	1	NE	0	8	2	2	0	0	4
19/05/2021	06:20	09:20	AU21_047	1	1	NE	1	8	2	2	0	0	12
19/05/2021	06:20	09:20	AU21_047	2	1	NE	0	7	2	2	0	0	12
19/05/2021	06:20	09:20	AU21_047	3	1	NE	0	7	2	2	0	0	12
19/05/2021	09:50	12:50	AU21_048	1	1	NE	0	7	2	2	0	0	12
19/05/2021	09:50	12:50	AU21_048	2	1	NE	0	7	2	2	0	0	12
19/05/2021	09:50	12:50	AU21_048	3	1	NE	0	7	2	2	0	0	12
22/05/2021	07:15	10:15	AU21_049	1	2	NW	0	8	2	2	0	0	8
22/05/2021	07:15	10:15	AU21_049	2	2	NW	0	8	2	2	0	0	8
22/05/2021	07:15	10:15	AU21_049	3	2	NW	0	7	2	2	0	0	9
22/05/2021	10:15	13:15	AU21_050	1	2	NW	0	7	2	2	2	0	10
22/05/2021	10:15	13:15	AU21_050	2	2	NW	0	7	2	2	2	0	12
22/05/2021	10:15	13:15	AU21_050	3	3	NW	0	6	2	2	2	0	12
28/05/2021	10:15	13:15	AU21_051	1	2	NE	0	3	2	2	0	0	10
28/05/2021	10:15	13:15	AU21_051	2	2	NE	0	2	2	2	0	0	11
28/05/2021	10:15	13:15	AU21_051	3	2	NE	0	2	2	2	0	0	13
28/05/2021	13:15	16:15	AU21_052	1	1	NE	0	2	2	2	0	0	14
28/05/2021	13:15	16:15	AU21_052	2	1	NE	0	1	2	2	0	0	14
28/05/2021	13:15	16:15	AU21_052	3	1	NE	0	1	2	2	0	0	15

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
03/06/2021	12:20	15:20	AU21_053	1	3	SSE	0	6	2	2	0	0	12
03/06/2021	12:20	15:20	AU21_053	2	3	SSE	0	6	2	2	0	0	14
03/06/2021	12:20	15:20	AU21_053	3	4	SSE	0	6	2	2	0	0	14
03/06/2021	15:20	18:20	AU21_054	1	4	SSE	0	4	2	2	0	0	14
03/06/2021	15:20	18:20	AU21_054	2	4	SSE	0	5	2	2	0	0	12
03/06/2021	15:20	18:20	AU21_054	3	4	SSE	0	5	2	2	0	0	12
04/06/2021	08:10	11:10	AU21_055	1	3	SW	0	2	2	2	0	0	12
04/06/2021	08:10	11:10	AU21_055	2	3	SW	0	2	2	2	0	0	13
04/06/2021	08:10	11:10	AU21_055	3	3	SW	0	2	2	2	0	0	13
04/06/2021	11:10	14:10	AU21_056	1	3	SW	0	2	2	2	0	0	13
04/06/2021	11:10	14:10	AU21_056	2	2	S	0	2	2	2	0	0	14
04/06/2021	11:10	14:10	AU21_056	3	2	S	0	2	2	2	0	0	14
13/06/2021	07:45	10:45	AU21_057	1	2	SW	0	1	2	2	0	0	14
13/06/2021	07:45	10:45	AU21_057	2	2	SW	0	1	2	2	0	0	15
13/06/2021	07:45	10:45	AU21_057	3	2	SW	0	1	2	2	0	0	15
13/06/2021	11:00	14:00	AU21_058	1	2	SW	0	1	2	2	0	0	15
13/06/2021	11:00	14:00	AU21_058	2	2	SW	0	1	2	2	0	0	16
13/06/2021	11:00	14:00	AU21_058	3	2	SW	0	1	2	2	0	0	16
18/06/2021	11:30	14:30	AU21_059	1	1	NW	0	7	2	2	0	0	14
18/06/2021	11:30	14:30	AU21_059	2	1	NW	0	7	2	2	0	0	14
18/06/2021	11:30	14:30	AU21_059	3	1	NW	0	7	2	2	0	0	14
18/06/2021	14:30	17:30	AU21_060	1	1	NW	0	7	2	2	0	0	14
18/06/2021	14:30	17:30	AU21_060	2	1	NW	0	7	2	2	0	0	14

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
18/06/2021	14:30	17:30	AU21_060	3	1	NW	0	7	2	2	0	0	14
22/06/2021	08:00	11:00	AU21_061	1	1	W	0	2	2	2	0	0	13
22/06/2021	08:00	11:00	AU21_061	2	1	W	0	3	2	2	0	0	13
22/06/2021	08:00	11:00	AU21_061	3	1	W	0	3	2	2	0	0	14
22/06/2021	11:00	14:00	AU21_062	1	1	W	0	2	2	2	0	0	14
22/06/2021	11:00	14:00	AU21_062	2	1	W	0	2	2	2	0	0	14
22/06/2021	11:00	14:00	AU21_062	3	1	SW	0	2	2	2	0	0	15
22/06/2021	14:15	17:15	AU21_063	1	1	SW	0	1	2	2	0	0	15
22/06/2021	14:15	17:15	AU21_063	2	2	SW	0	2	2	2	0	0	14
22/06/2021	14:15	17:15	AU21_063	3	2	SW	0	2	2	2	0	0	14
23/06/2021	11:00	14:00	AU21_064	1	2	SW	0	4	2	2	0	0	15
23/06/2021	11:00	14:00	AU21_064	2	2	SW	0	3	2	2	0	0	15
23/06/2021	11:00	14:00	AU21_064	3	3	W	0	3	2	2	0	0	16
23/06/2021	14:00	17:00	AU21_065	1	2	SW	0	6	2	2	0	0	14
23/06/2021	14:00	17:00	AU21_065	2	3	W	0	6	2	2	0	0	15
23/06/2021	14:00	17:00	AU21_065	3	2	SW	0	5	2	2	0	0	15
23/06/2021	17:00	20:00	AU21_066	1	3	SW	0	4	2	2	0	0	15
23/06/2021	17:00	20:00	AU21_066	2	3	SW	0	5	2	2	0	0	15
23/06/2021	17:00	20:00	AU21_066	3	3	SW	0	6	2	2	0	0	14
04/07/2021	12:00	15:00	AU21_067	1	2	E	0	8	2	2	0	0	15
04/07/2021	12:00	15:00	AU21_067	2	2	E	1	8	2	2	0	0	16
04/07/2021	12:00	15:00	AU21_067	3	2	E	0	8	2	2	0	0	15
04/07/2021	15:00	18:00	AU21_068	1	2	E	0	8	2	2	0	0	16

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
04/07/2021	15:00	18:00	AU21_068	2	2	E	0	8	2	2	0	0	16
04/07/2021	15:00	18:00	AU21_068	3	2	E	0	8	2	2	0	0	16
05/07/2021	10:25	13:25	AU21_069	1	1	E	1	8	2	2	0	0	15
05/07/2021	10:25	13:25	AU21_069	2	1	E	0	8	2	2	0	0	15
05/07/2021	10:25	13:25	AU21_069	3	1	E	1	8	2	2	0	0	16
18/07/2021	16:40	19:40	AU21_070	1	2	W	0	2	2	2	0	0	17
18/07/2021	16:40	19:40	AU21_070	2	2	SW	0	3	2	2	0	0	17
18/07/2021	16:40	19:40	AU21_070	3	2	W	0	3	2	2	0	0	18
18/07/2021	13:40	16:40	AU21_071	1	1	W	0	2	2	2	0	0	17
18/07/2021	13:40	16:40	AU21_071	2	1	SW	0	1	2	2	0	0	17
18/07/2021	13:40	16:40	AU21_071	3	1	SW	0	1	2	2	0	0	16
19/07/2021	11:10	14:10	AU21_072	1	1	E	0	2	2	2	0	0	17
19/07/2021	11:10	14:10	AU21_072	2	1	E	0	3	2	2	0	0	18
19/07/2021	11:10	14:10	AU21_072	3	1	E	0	2	2	2	0	0	18
19/07/2021	08:10	11:10	AU21_073	1	1	E	0	2	2	2	0	0	14
19/07/2021	08:10	11:10	AU21_073	2	1	E	0	1	2	2	0	0	14
19/07/2021	08:10	11:10	AU21_073	3	1	NE	0	1	2	2	0	0	15
20/07/2021	09:00	12:00	AU21_074	1	1	NE	0	8	2	2	0	0	14
20/07/2021	09:00	12:00	AU21_074	2	1	NE	0	7	2	2	0	0	15
20/07/2021	09:00	12:00	AU21_074	3	1	NE	0	6	2	2	0	0	16
29/07/2021	09:00	12:00	AU21_075	1	2	NW	2	8	1	1	0	0	10
29/07/2021	09:00	12:00	AU21_075	2	3	NW	2	8	1	1	0	0	12
29/07/2021	09:00	12:00	AU21_075	3	3	NW	2	8	1	2	0	0	12

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
29/07/2021	12:00	15:00	AU21_076	1	2	NW	1	8	1	1	0	0	13
29/07/2021	12:00	15:00	AU21_076	2	3	NW	0	8	1	2	0	0	13
29/07/2021	12:00	15:00	AU21_076	3	3	NW	0	8	2	2	0	0	13
29/07/2021	15:00	18:00	AU21_077	1	2	NW	0	8	2	2	0	0	14
29/07/2021	15:00	18:00	AU21_077	2	2	NW	0	8	2	2	0	0	14
29/07/2021	15:00	18:00	AU21_077	3	2	NW	0	8	2	2	0	0	13
30/07/2021	07:45	10:45	AU21_078	1	1	NW	1	8	1	1	0	0	12
30/07/2021	07:45	10:45	AU21_078	2	1	NW	1	8	2	2	0	0	13
30/07/2021	07:45	10:45	AU21_078	3	1	NW	1	8	2	2	0	0	14
30/07/2021	10:45	13:45	AU21_079	1	1	NW	1	8	2	2	0	0	12
30/07/2021	10:45	13:45	AU21_079	2	1	NW	0	8	2	2	0	0	12
30/07/2021	10:45	13:45	AU21_079	3	1	NW	0	8	2	2	0	0	13
30/07/2021	13:45	16:45	AU21_080	1	1	NW	0	8	2	2	0	0	14
30/07/2021	13:45	16:45	AU21_080	2	2	NW	0	8	2	2	0	0	14
30/07/2021	13:45	16:45	AU21_080	3	2	NW	0	8	2	2	0	0	13
14/08/2021	10:00	13:00	AU21_081	1	4	W	0	7	0	2	0	0	16
14/08/2021	10:00	13:00	AU21_081	2	4	W	0	7	0	2	0	0	16
14/08/2021	10:00	13:00	AU21_081	3	4	W	0	7	0	2	0	0	16
14/08/2021	13:30	16:30	AU21_082	1	5	W	2	8	0	2	0	0	15
14/08/2021	13:30	16:30	AU21_082	2	4	W	2	8	0	2	0	0	15
14/08/2021	13:30	16:30	AU21_082	3	4	W	2	8	0	2	0	0	13
14/08/2021	17:00	20:00	AU21_083	1	3	W	3	8	0	2	0	0	14
14/08/2021	17:00	20:00	AU21_083	2	3	W	0	8	0	2	0	0	14

Date	Survey Start	Survey End	Survey ID	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
14/08/2021	17:00	20:00	AU21_083	3	2	W	0	6	0	2	0	0	12
15/08/2021	07:00	10:00	AU21_084	1	4	W	0	8	1	2	0	0	13
15/08/2021	07:00	10:00	AU21_084	2	4	SW	0	8	1	2	0	0	15
15/08/2021	07:00	10:00	AU21_084	3	4	SW	0	8	1	2	0	0	15
15/08/2021	10:30	13:30	AU21_085	1	5	W	0	7	1	2	0	0	14
15/08/2021	10:30	13:30	AU21_085	2	5	W	0	8	1	2	0	0	14
15/08/2021	10:30	13:30	AU21_085	3	5	W	0	8	1	2	0	0	16
15/08/2021	14:15	17:15	AU21_086	1	5	W	0	8	1	2	0	0	16
15/08/2021	14:15	17:15	AU21_086	2	5	W	3	8	1	2	0	0	16
15/08/2021	14:15	17:15	AU21_086	3	5	W	3	8	1	2	0	0	16
16/08/2021	05:15	08:15	AU21_087	1	5	NW	0	8	1	2	0	0	5
16/08/2021	05:15	08:15	AU21_087	2	5	NW	0	5	1	2	0	0	6
16/08/2021	05:15	08:15	AU21_087	3	5	NW	0	4	1	2	0	0	8
16/08/2021	08:45	11:45	AU21_088	1	4	NW	0	4	1	2	0	0	13
16/08/2021	08:45	11:45	AU21_088	2	4	NW	0	4	1	2	0	0	14
16/08/2021	08:45	11:45	AU21_088	3	5	NW	0	5	1	2	0	0	14

Table A1-4
Weather Data Sep 21 – Feb 22

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
06/09/2021	13:30	16:30	1	3	SE	0	7	1	2	0	0	22	
06/09/2021	13:30	16:30	2	4	SE	0	7	1	2	0	0	21	
06/09/2021	13:30	16:30	3	3	SE	0	8	1	2	0	0		
06/09/2021	17:00	20:00	1	3	SSE	0	4	1	2	0	0	19	
06/09/2021	17:00	20:00	2	4	SSE	0	5	1	2	0	0	17	
06/09/2021	17:00	20:00	3	4	SSE	0	5	1	2	0	0	15	
07/09/2021	06:00	09:00	1	4	S	0	7	1	2	0	0	16	
07/09/2021	06:00	09:00	2	4	S	0	8	1	2	0	0	16	
07/09/2021	06:00	09:00	3	3	S	0	6	1	2	0	0	17	
07/09/2021	09:30	12:30	1	3	S	0	6	1	2	0	0	17	
07/09/2021	09:30	12:30	2	4	S	0	7	1	2	0	0	18	
07/09/2021	09:30	12:30	3	4	S	0	6	1	2	0	0	18	
09/09/2021	12:15	15:15	1	3	NE	0	8	0	0	0	0	16	
09/09/2021	12:15	15:15	2	2	NE	0	8	0	1	0	0	17	
09/09/2021	12:15	15:15	3	3	NE	0	8	0	1	0	0	17	
09/09/2021	15:45	17:45	1	2	NE	0	7	0	2	0	0	17	
09/09/2021	15:45	17:45	2	2	NE	0	8	0	0	0	0	15	
10/09/2021	06:00	09:00	1	1	N	0	8	0	0	0	0	15	

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
10/09/2021	06:00	09:00	2	1	N	0	8	0	1	0	0	15	
10/09/2021	06:00	09:00	3	1	N	0	8	0	1	0	0	15	
10/09/2021	09:30	12:30	1	1	N	1	8	0	1	0	0	15	
10/09/2021	09:30	12:30	2	1	N	1	8	0	1	0	0	15	
10/09/2021	09:30	12:30	3	1	N	0	8	0	1	0	0	15	
10/09/2021	13:00	14:00	1	2	N	1	8	0	1	0	0	16	
22/09/2021	07:45	10:45	1	4	SW	0	1	2	2	0	0	10	
22/09/2021	07:45	10:45	2	4	SW	0	4	2	2	0	0	11	
22/09/2021	07:45	10:45	3	4	SW	1	7	2	2	0	0	11	
26/09/2021	12:15	15:15	1	5	S	0	3	1	2	0	0	20	
26/09/2021	12:15	15:15	2	5	SSE	0	2	2	2	0	0	20	
26/09/2021	12:15	15:15	3	5	SSE	0	6	1	2	0	0	20	
26/09/2021	15:45	18:45	1	5	SSE	0	7	1	2	0	0	17	
26/09/2021	15:45	18:45	2	5	SSE	2	8	1	2	0	0	17	
26/09/2021	15:45	18:45	3	4	SSE	0	7	1	2	0	0	15	
27/09/2021	06:45	09:45	1	2	W	2	8	0	1	0	0	10	
27/09/2021	06:45	09:45	2	2	W	3	8	0	1	0	0	10	
27/09/2021	06:45	09:45	3	2	W	3	8	0	1	0	0	10	
27/09/2021	10:15	13:15	1	3	W	3	8	0	1	0	0	10	

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
27/09/2021	10:15	13:15	2	3	W	3	8	0	1	0	0	10	
27/09/2021	10:15	13:15	3	3	W	3	8	0	1	0	0	8	
28/09/2021	07:45	10:45	1	3	S	0	1	2	2	0	0	6	
28/09/2021	07:45	10:45	2	3	S	0	1	2	2	0	0	7	
28/09/2021	07:45	10:45	3	4	S	0	2	2	2	0	0	7	
28/09/2021	11:00	14:00	1	4	S	0	3	2	2	0	0	8	
28/09/2021	11:00	14:00	2	3	S	0	4	2	2	0	0	8	
28/09/2021	11:00	14:00	3	3	S	0	4	2	2	0	0	9	
28/09/2021	14:30	17:30	1	3	S	0	4	2	2	0	0	8	
28/09/2021	14:30	17:30	2	3	S	0	5	2	2	0	0	9	
28/09/2021	14:30	17:30	3	3	S	0	7	2	2	0	0	9	
04/10/2021	10:00	13:00	1	3	SSW	0	7	2	2	0	0	13	
04/10/2021	10:00	13:00	2	3	SSW	0	6	2	2	0	0	14	
04/10/2021	10:00	13:00	3	4	SSW	0	4	2	2	0	0	15	
04/10/2021	13:30	16:30	1	3	SSW	0	6	2	2	0	0	15	
04/10/2021	13:30	16:30	2	3	SSW	0	7	2	2	0	0	15	
04/10/2021	13:30	16:30	3	3	SSW	2	7	2	2	0	0	13	
05/10/2021	15:30	18:30	1	4	NNW	0	8	1	2	0	0	12	
05/10/2021	15:30	18:30	2	5	NNW	0	8	1	2	0	0	10	

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
05/10/2021	15:30	18:30	3	5	NNW	2	8	0	2	0	0	10	
06/10/2021	06:50	09:50	1	3	NW	2	8	0	0	0	0	9	
06/10/2021	06:50	09:50	2	3	NW	1	8	0	1	0	0	10	
06/10/2021	06:50	09:50	3	4	NW	1	8	0	1	0	0	12	
06/10/2021	10:30	13:30	1	3	N	1	8	0	2	0	0	10	
06/10/2021	10:30	13:30	2	2	N	0	7	1	2	0	0	10	
06/10/2021	10:30	13:30	3	2	N	0	6	1	2	0	0	13	
06/10/2021	14:00	17:00	1	2	N	0	6	1	2	0	0	13	
06/10/2021	14:00	17:00	2	2	N	0	4	1	2	0	0	13	
06/10/2021	14:00	17:00	3	2	N	0	4	1	2	0	0	13	
07/10/2021	10:45	13:45	1	5	S	0	8	2	2	0	0	14	
07/10/2021	10:45	13:45	2	5	S	0	8	2	2	0	0	14	
07/10/2021	10:45	13:45	3	5	S	2	8	2	2	0	0	16	
08/10/2021	07:15	10:15	1	5	S	0	8	1	2	0	0	13	
08/10/2021	07:15	10:15	2	4	S	0	8	1	2	0	0	14	
08/10/2021	07:15	10:15	3	4	S	0	8	1	2	0	0	14	
11/10/2021	11:10	14:10	1	2	NW	0	8	2	2	0	0	11	
11/10/2021	11:10	14:10	2	2	NW	0	8	2	2	0	0	11	
11/10/2021	11:10	14:10	3	3	NW	0	8	2	2	0	0	11	

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
11/10/2021	14:40	17:40	1	2	NW	1	8	2	2	0	0	11	
11/10/2021	14:40	17:40	2	2	NW	2	8	2	2	0	0	10	
11/10/2021	14:40	17:40	3	2	NW	1	8	2	2	0	0	10	
12/10/2021	07:30	10:30	1	0		0	8	2	2	0	0	6	
12/10/2021	07:30	10:30	2	0		0	8	2	2	0	0	6	
12/10/2021	07:30	10:30	3	0		0	8	2	2	0	0	7	
12/10/2021	11:00	14:00	1	0		0	8	2	2	0	0	6	
12/10/2021	11:00	14:00	2	0		0	8	2	2	0	0	6	
12/10/2021	11:00	14:00	3	0		0	7	2	2	0	0	6	
12/10/2021	15:00	18:00	1	0		0	8	2	2	0	0	7	
12/10/2021	15:00	18:00	2	0		0	5	2	2	0	0	7	
12/10/2021	15:00	18:00	3	0		0	4	2	2	0	0	7	
13/10/2021	08:00	11:00	1	2	NE	0	8	2	2	0	0	10	
13/10/2021	08:00	11:00	2	3	NE	0	8	2	2	0	0	10	
13/10/2021	08:00	11:00	3	3	NE	0	8	2	2	0	0	10	
13/10/2021	11:30	14:30	1	2	NE	0	8	2	2	0	0	12	
13/10/2021	11:30	14:30	2	3	NE	0	8	2	2	0	0	12	
13/10/2021	11:30	14:30	3	2	NE	0	8	2	2	0	0	12	
13/10/2021	15:00	18:00	1	2	NE	0	8	2	2	0	0	12	

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
13/10/2021	15:00	18:00	2	2	NE	2	8	2	2	0	0	12	
13/10/2021	15:00	18:00	3	2	NE	0	8	2	2	0	0	11	
05/11/2021	12:00	15:00	1	5	NW	0	8	1	2	0	0	10	
05/11/2021	12:00	15:00	2	5	WNW	0	8	1	2	0	0	10	
05/11/2021	12:00	15:00	3	5	W	0	8	1	2	0	0	8	
05/11/2021	15:30	16:30	1	4	W	0	7	1	2	0	0	7	
07/11/2021	07:30	10:30	1	6	W	0	5	2	2	0	0	8	
07/11/2021	07:30	10:30	2	6	WNW	0	4	2	2	0	0	8	
07/11/2021	07:30	10:30	3	6	WNW	0	4	2	2	0	0	9	
07/11/2021	11:00	14:00	1	5	W	0	7	2	2	0	0	10	
07/11/2021	11:00	14:00	2	6	WNW	0	6	1	2	0	0	10	
07/11/2021	11:00	14:00	3	6	W	0	5	1	2	0	0	10	
07/11/2021	14:30	16:30	1	7	W	2	8	1	2	0	0	10	
07/11/2021	14:30	16:30	2	6	W	2	7	1	2	0	0	10	
21/11/2021	09:15	12:15	1	5	NNE	2	7	1	2	0	0	4	
21/11/2021	09:15	12:15	2	5	NNE	2	8	1	2	0	0	4	
21/11/2021	09:15	12:15	3	6	NNE	3	8	1	2	0	0	4	
21/11/2021	12:55	15:55	1	5	NNE	3	7	1	2	0	0	5	
21/11/2021	12:55	15:55	2	5	NNE	3	8	1	2	0	0	5	

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
21/11/2021	12:55	15:55	3	4	NNE	3	7	1	2	0	0	5	
22/11/2021	07:40	10:40	1	6	WSW	0	8	2	2	0	0	7	
22/11/2021	07:40	10:40	2	6	WSW	0	8	2	2	0	0	7	
22/11/2021	07:40	10:40	3	6	WSW	0	8	2	2	0	0	7	
22/11/2021	11:20	14:20	1	6	WSW	0	8	2	2	0	0	6	
22/11/2021	11:20	14:20	2	6	WSW	0	8	2	2	0	0	6	
22/11/2021	11:20	14:20	3	6	W	2	8	2	2	0	0	6	
15/12/2021	09:00	12:00	1	4	SW	0	7	1	2	0	0	10	
15/12/2021	09:00	12:00	2	4	SW	0	7	1	2	0	0	10	
15/12/2021	09:00	12:00	3	5	SW	0	6	1	2	0	0	10	
15/12/2021	12:30	15:30	1	5	SW	0	6	1	2	0	0	10	
15/12/2021	12:30	15:30	2	5	SW	0	5	1	2	0	0	10	
15/12/2021	12:30	15:30	3	4	SW	0	5	1	2	0	0	8	
16/12/2021	08:30	11:30	1	2	SW	0	8	2	2	0	0	8	
16/12/2021	08:30	11:30	2	2	SW	0	8	2	2	0	0	8	
16/12/2021	08:30	11:30	3	4	SW	0	8	2	2	0	0	8	
16/12/2021	12:15	15:15	1	4	SW	2	8	2	2	0	0	9	
16/12/2021	12:15	15:15	2	5	SW	0	7	2	2	0	0	10	
16/12/2021	12:15	15:15	3	5	SW	0	6	2	2	0	0	8	

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
22/12/2021	08:30	11:30	1	2	S	0	7	2	2	0	1	-1	
22/12/2021	08:30	11:30	2	2	S	0	7	2	2	0	1	-1	
22/12/2021	08:30	11:30	3	2	S	0	8	2	2	0	0	-2	
22/12/2021	12:15	15:15	1	2	S	0	8	2	2	0	1	-2	
22/12/2021	12:15	15:15	2	2	S	0	8	2	2	0	1	-2	
22/12/2021	12:15	15:15	3	2	S	0	8	2	2	0	1	-2	
24/12/2021	08:30	11:30	1	3	E	0	8	1	2	0	0	3	
24/12/2021	08:30	11:30	2	3	E	0	8	1	2	0	0	3	
24/12/2021	08:30	11:30	3	3	E	0	8	1	2	0	0	3	
24/12/2021	12:00	15:00	1	3	E	0	6	1	2	0	0	3	
24/12/2021	12:00	15:00	2	3	E	0	3	1	2	0	0	2	
24/12/2021	12:00	15:00	3	3	E	0	2	1	2	0	0	2	
06/01/2022	09:00	12:00	1	6	S	2	8	1	2	1	0	3	5% snow cover
06/01/2022	09:00	12:00	2	6	S	2	8	1	2	1	0	3	5% snow cover
06/01/2022	09:00	12:00	3	6	S	2	8	1	2	1	0	3	40% snow cover
06/01/2022	12:45	15:45	1	6	S	0	8	1	2	1	0	3	40% snow cover
06/01/2022	12:45	15:45	2	6	S	0	7	1	2	1	0	3	40% snow cover
06/01/2022	12:45	15:45	3	5	S	0	6	2	2	1	0	2	40% snow cover
07/01/2022	09:00	12:00	1	5	W	0	3	2	2	1	0	3	20% snow cover

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)	Notes
07/01/2022	09:00	12:00	2	5	W	0	2	2	2	1	0	3	20% snow cover
07/01/2022	09:00	12:00	3	4	W	0	3	2	2	1	0	3	20% snow cover
07/01/2022	12:40	15:40	1	4	W	0	2	2	2	1	0	3	Small patches of snow
07/01/2022	12:40	15:40	2	5	W	0	2	2	2	1	0	2	Small patches of snow
07/01/2022	12:40	15:40	3	5	W	0	1	2	2	1	0	2	Small patches of snow
18/01/2022	09:45	12:45	1	3	SW	0	8	2	2	0	0	4	
18/01/2022	09:45	12:45	2	3	SW	0	7	2	2	0	0	4	
18/01/2022	09:45	12:45	3	3	SW	0	8	2	2	0	0	4	
18/01/2022	13:15	16:15	1	3	SW	0	8	2	2	0	0	4	
18/01/2022	13:15	16:15	2	3	SW	0	6	2	2	0	0	3	
18/01/2022	13:15	16:15	3	4	SW	0	5	2	2	0	0	3	
19/01/2022	09:10	12:10	1	3	NW	2	6	2	2	0	0	4	
19/01/2022	09:10	12:10	2	3	NW	0	3	2	2	0	0	4	
19/01/2022	09:10	12:10	3	4	NW	0	7	2	2	0	0	4	
19/01/2022	12:40	15:40	1	3	NW	0	6	2	2	0	0	3	
19/01/2022	12:40	15:40	2	3	NW	2	7	2	2	0	0	4	
19/01/2022	12:40	15:40	3	4	NW	2	7	2	2	0	0	3	
01/02/2022	08:00	11:00	1	6	W	2	6	2	2	0	0	7	

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
01/02/2022	08:00	11:00	2	6	W	3	7	2	2	0	0	7	
01/02/2022	08:00	11:00	3	6	W	2	7	2	2	0	0	7	
01/02/2022	11:30	14:30	1	6	W	3	6	2	2	0	0	6	
01/02/2022	11:30	14:30	2	6	W	3	7	1	2	0	0	6	
01/02/2022	11:30	14:30	3	6	W	2	7	1	2	0	0	6	
14/02/2022	09:15	12:15	1	4	NW	1	8	0	1	0	0	6	
14/02/2022	09:15	12:15	2	4	NW	1	8	0	1	0	0	6	
14/02/2022	09:15	12:15	3	4	NW	1	8	1	2	0	0	6	
14/02/2022	12:45	15:45	1	3	NW	1	8	1	1	0	0	4	
14/02/2022	12:45	15:45	2	5	NW	3	8	1	2	0	0	4	
14/02/2022	12:45	15:45	3	5	NW	2	7	1	2	0	0	4	
22/02/2022	11:10	14:10	1	4	NW	0	4	2	2	1	0	4	
22/02/2022	11:10	14:10	2	5	NW	0	4	2	2	1	0	4	
22/02/2022	11:10	14:10	3	4	NW	0	4	2	2	1	0	5	
22/02/2022	14:40	17:40	1	4	NW	0	5	2	2	1	0	4	
22/02/2022	14:40	17:40	2	3	NW	0	2	2	2	1	0	5	
22/02/2022	14:40	17:40	3	4	NW	0	1	2	2	1	0	3	
23/02/2022	08:30	11:30	1	6	SW	0	7	2	2	1	0	4	
23/02/2022	08:30	11:30	2	6	SW	2	8	2	2	1	0	5	

Date	Survey Start	Survey End	Hr	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)	Notes
23/02/2022	08:30	11:30	3	6	SW	4	8	1	2	1	0	5	
23/02/2022	12:00	15:00	1	5	SW	1	8	2	2	1	0	6	
23/02/2022	12:00	15:00	2	4	SW	2	8	2	2	1	0	5	
23/02/2022	12:00	15:00	3	4	SW	1	8	2	2	1	0	5	

Key to Weather Codes

Wind Speed (Beaufort scale)	Rain/ Precipitation	Cloud Cover Expressed in oktas (n/8)	Cloud Height Height of cloud above average height of viewshed	Visibility	Lying Snow	Frost
Calm: 0	None: 0			Poor (<1km): 0	None: 0	None: 0
Light air: 1	Drizzle: 1			Moderate (1-3km): 1	On Site: 1	Ground: 1
Light breeze: 2	Light showers / snow: 2			Good (>3km): 2	On higher ground: 2	All day: 2
Gentle breeze: 3	Heavy showers / snow: 3					
Moderate breeze: 4	Heavy rain / snow: 4					
Fresh breeze: 5						
Strong breeze: 6		<150m: 0				
Moderate gale: 7		150-500m: 1				
Gale: 8		>500m: 2				

Table A1-5
VP Target Species Flight Data (Mar – Aug 21)

Date	VP code	Survey ID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
25/03/2021	1	AU21_001	FN	1.AU21_001.4.1	PG	28	Adult	Unidentified	11:26	150	3 - On passage	38	
26/03/2021	2	AU21_003	FN	2.AU21_003.2.1	PE	1	Unknown	Unidentified	12:30	>200	3 - On passage	48	
26/03/2021	2	AU21_003	FN	2.AU21_003.3.1	GI	2	Adult	Unidentified	12:36	20	2 - Display	176	Went up to band 2 then back down
26/03/2021	2	AU21_003	FN	2.AU21_003.5.1	CU	1	Adult	Unidentified	13:33	0	1 - Foraging/hunting	62	Feeding then flew away
26/03/2021	2	AU21_003	FN	2.AU21_003.6.1	K.	1	Adult	Male	14:08	<25	1 - Foraging/hunting	200	
26/03/2021	2	AU21_003	FN	2.AU21_003.8.1	K.	1	Adult	Male	14:25	<25	1 - Foraging/hunting	70	
26/03/2021	3	AU21_004	FN	3.AU21_004.1.1	HH	1	Adult	Female	16:05	5	10 - Other	50	Flew off when it saw me
26/03/2021	3	AU21_004	FN	3.AU21_004.3.1	GI	1	Adult	Unidentified	16:32	<10	10 - Other	80	Flew through trees
27/03/2021	2	AU21_005	FN	2.AU21_005.1.1	PG	4	Adult	Unidentified	05:57	50	3 - On passage	28	

Date	VP code	Survey ID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
27/03/2021	2	AU21_005	FN	2.AU21_005.4.1	CU	1	Adult	Unidentified	06:23	10	10 - Other	20	
27/03/2021	2	AU21_005	FN	2.AU21_005.5.1	GI	1	Adult	Unidentified	07:18	15	6 - Circling	20	
27/03/2021	2	AU21_005	FN	2.AU21_005.7.1	WS	2	Adult	Unidentified	08:16	100	3 - On passage	65	
27/03/2021	4	AU21_007	FN	4.AU21_007.1.1	GI	1	Adult	Unidentified	12:48	15	10 - Other	20	
27/03/2021	4	AU21_007	FN	4.AU21_007.5.1	K.	1	Adult	Unidentified	13:15	10	1 - Foraging/hunting	15	
27/03/2021	2	AU21_005	FN	2.AU21_005.2.1	PG	10	Adult	Unidentified	06:07	80	3 - On passage	48	
27/03/2021	2	AU21_005	FN	2.AU21_005.3.1	PG	8	Adult	Unidentified	06:13	100	3 - On passage	65	
28/03/2021	3	AU21_015	FN	3.AU21_015.8.1	PG	10	Unknown	Unidentified	15:54	100	3 - On passage	80	
28/03/2021	3	AU21_015	FN	3.AU21_015.1.1	GI	1	Adult	Female	13:15	20	6 - Circling	40	
28/03/2021	3	AU21_015	FN	3.AU21_015.4.1	K.	1	Adult	Male	15:31	10	1 - Foraging/hunting	65	

Date	VP code	Survey ID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
28/03/2021	3	AU21_015	FN	3.AU21_015.2.1	PG	60	Unknown	Unidentified	14:20	>200	3 - On passage	80	
28/03/2021	3	AU21_015	FN	3.AU21_015.6.1	PG	110	Unknown	Unidentified	15:39	>200	3 - On passage	110	
29/03/2021	1	AU21_009	FN	1.AU21_009.1.1	GJ	1	Adult	Unidentified	06:45	50	3 - On passage	20	
29/03/2021	1	AU21_009	FN	1.AU21_009.2.1	GI	1	Adult	Unidentified	07:17	20	6 - Circling	100	
29/03/2021	1	AU21_009	FN	1.AU21_009.4.1	PG	20	Unknown	Unidentified	07:21	100	3 - On passage	55	
29/03/2021	2	AU21_010	FN	2.AU21_010.5.1	GI	1	Adult	Female	11:15	20	6 - Circling	220	
29/03/2021	2	AU21_010	FN	2.AU21_010.6.1	K.	1	Adult	Unidentified	11:14	10	1 - Foraging/hunting	20	
29/03/2021	2	AU21_010	FN	2.AU21_010.8.1	GI	1	Adult	Unidentified	11:47	10	10 - Other	25	
29/03/2021	1	AU21_009	FN	1.AU21_009.7.1	PG	200	Unknown	Unidentified	07:30	100	3 - On passage	80	
29/03/2021	2	AU21_010	FN	2.AU21_010.9.1	PG	70	Adult	Unidentified	12:36	100	3 - On passage	110	

Date	VP code	Survey ID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
29/03/2021	1	AU21_009	FN	1.AU21_009.3.1	PG	100	Unknown	Unidentified	07:20	>200	3 - On passage	40	
29/03/2021	1	AU21_009	FN	1.AU21_009.5.1	PG	200	Unknown	Unidentified	07:25	>200	3 - On passage	70	
29/03/2021	1	AU21_009	FN	1.AU21_009.6.1	PG	100	Unknown	Unidentified	07:27	>200	3 - On passage	20	
29/03/2021	1	AU21_009	FN	1.AU21_009.8.1	PG	100	Unknown	Unidentified	09:26	>200	3 - On passage	50	
30/03/2021	3	AU21_011	FN	3.AU21_011.1.1	PG	14	Adult	Unidentified	06:49	20	3 - On passage	35	
30/03/2021	3	AU21_011	FN	3.AU21_011.6.1	PG	10	Adult	Unidentified	08:38	100	3 - On passage	40	
30/03/2021	4	AU21_012	FN	4.AU21_012.1.1	PG	14	Adult	Unidentified	11:51	100	3 - On passage	25	
30/03/2021	3	AU21_011	FN	3.AU21_011.2.1	PG	10	Adult	Unidentified	07:43	>200	3 - On passage	25	
30/03/2021	3	AU21_011	FN	3.AU21_011.3.1	PG	40	Adult	Unidentified	07:58	>200	3 - On passage	65	
30/03/2021	3	AU21_011	FN	3.AU21_011.4.1	PG	50	Adult	Unidentified	08:02	>200	3 - On passage	80	
30/03/2021	3	AU21_011	FN	3.AU21_011.5.1	PG	50	Adult	Unidentified	08:13	>200	3 - On passage	50	

Date	VP code	Survey ID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
31/03/2021	2	AU21_014	FN	2.AU21_014.5.1	PG	50	Adult	Unidentified	17:18	100	3 - On passage	40	
31/03/2021	2	AU21_014	FN	2.AU21_014.6.1	PG	130	Adult	Unidentified	18:31	100	3 - On passage	110	
31/03/2021	2	AU21_014	FN	2.AU21_014.1.1	CU	1	Adult	Unidentified	16:51	5	10 - Other	10	
31/03/2021	2	AU21_014	FN	2.AU21_014.2.1	CU	1	Adult	Unidentified	16:59	5	10 - Other	20	
31/03/2021	2	AU21_014	FN	2.AU21_014.3.1	CU	1	Adult	Unidentified	07:02	5	10 - Other	20	
02/04/2021	1	AU21_017	FN	1.AU21_017.1.1	K.	1	Adult	Unidentified	16:09	5	10 - Other	20	
02/04/2021	2	AU21_018	FN	2.AU21_018.1.1	CU	1	Adult	Unidentified	17:01	3	10 - Other	40	
02/04/2021	2	AU21_018	FN	2.AU21_018.2.1	GJ	2	Adult	Unidentified	18:26	10	10 - Other	50	
03/04/2021	4	AU21_019	FN	4.AU21_019.1.1	GI	1	Adult	Unidentified	13:17	20	6 - Circling	70	
03/04/2021	3	AU21_020	FN	3.AU21_020.1.1	HH	1	Adult	Female	16:50	10	10 - Other	10	
04/04/2021	1	AU21_021	FN	1.AU21_021.7.1	PG	19	Adult	Unidentified	07:36	50	3 - On passage	45	

Date	VP code	Survey ID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
04/04/2021	1	AU21_021	FN	1.AU21_021.1.1	PG	30	Adult	Unidentified	06:26	100	3 - On passage	20	
04/04/2021	1	AU21_021	FN	1.AU21_021.2.1	PG	40	Adult	Unidentified	06:28	100	3 - On passage	20	
04/04/2021	1	AU21_021	FN	1.AU21_021.3.1	PG	70	Adult	Unidentified	06:30	100	3 - On passage	40	
04/04/2021	1	AU21_021	FN	1.AU21_021.4.1	PG	10	Adult	Unidentified	07:06	100	3 - On passage	25	
04/04/2021	1	AU21_021	FN	1.AU21_021.5.1	PG	90	Adult	Unidentified	07:09	100	3 - On passage	100	
04/04/2021	1	AU21_021	FN	1.AU21_021.6.1	PG	13	Adult	Unidentified	07:24	100	3 - On passage	65	
04/04/2021	2	AU21_022	FN	2.AU21_022.6.1	PG	70	Adult	Unidentified	11:01	100	3 - On passage	40	
04/04/2021	2	AU21_022	FN	2.AU21_022.1.1	GJ	8	Adult	Unidentified	10:09	20	3 - On passage	35	
04/04/2021	2	AU21_022	FN	2.AU21_022.2.1	CU	1	Adult	Unidentified	10:18	5	10 - Other	10	
04/04/2021	2	AU21_022	FN	2.AU21_022.3.1	GI	1	Adult	Unidentified	10:20	20	6 - Circling	55	
04/04/2021	2	AU21_022	FN	2.AU21_022.4.1	CU	1	Adult	Unidentified	10:30	5	10 - Other	10	

Date	VP code	Survey ID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
04/04/2021	2	AU21_022	FN	2.AU21_022.5.1	LB	2	Adult	Unidentified	10:05	10	10 - Other	20	
07/04/2021	3	AU21_023	FN	3.AU21_023.1.1	PG	100	Adult	Unidentified	14:29	40	10 - Other	125	
07/04/2021	4	AU21_024	FN	4.AU21_024.1.1	GI	1	Unknown	Unidentified	17:41	20	1 - Foraging/hunting	115	
08/04/2021	2	AU21_025	FN	2.AU21_025.2.1	PG	7	Adult	Unidentified	07:25	50	3 - On passage	40	
08/04/2021	2	AU21_025	FN	2.AU21_025.3.1	PG	45	Adult	Unidentified	08:09	50	3 - On passage	30	
08/04/2021	2	AU21_025	FN	2.AU21_025.5.1	PG	60	Adult	Unidentified	08:15	70	3 - On passage	55	
08/04/2021	2	AU21_025	FN	2.AU21_025.4.1	PG	80	Adult	Unidentified	08:12	100	3 - On passage	70	
08/04/2021	2	AU21_025	FN	2.AU21_025.1.1	CU	1	Adult	Unidentified	06:46	5	10 - Other	10	
17/04/2021	3	AU21_028	FN	3.AU21_028.1.1	K.	1	Adult	Unidentified	15:26	5	1 - Foraging/hunting	40	
25/04/2021	3	AU21_035	FN	3.AU21_035.1.1	K.	1	Adult	Unidentified	11:02	10	1 - Foraging/hunting	40	

Date	VP code	Survey ID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
25/04/2021	3	AU21_035	FN	3.AU21_035.2.1	K.	1	Adult	Male	12:15	10	1 - Foraging/hunting	20	
25/04/2021	1	AU21_036	FN	1.AU21_036.1.1	K.	1	Adult	Unidentified	13:20	5	1 - Foraging/hunting	40	
25/04/2021	2	AU21_037	FN	2.AU21_037.1.1	CU	1	Adult	Unidentified	17:10	5	10 - Other	20	
02/05/2021	1	AU21_038	FN	1.AU21_038.1.1	SH	1	Adult	Unidentified	12:07	5	10 - Other	10	
19/05/2021	4	AU21_047	FN	4.AU21_047.2.1	SH	1	Adult	Unidentified	08:20	10	10 - Other	20	
14/06/2021	2	AU21_057	FN	2.AU21_057.1.1	GJ	2	Adult	Unidentified	08:30	20	3 - On passage	40	
14/06/2021	2	AU21_057	FN	2.AU21_057.2.1	K.	1	Adult	Unidentified	09:01	25	1 - Foraging/hunting	55	
18/06/2021	3	AU21_059	FN	3.AU21_059.1.1	K.	1	Adult	Female	12:25	5	1 - Foraging/hunting	35	
14/08/2021	1	AU21_082	JM	1.AU21_082.1.1	OP	2	Adult	Unidentified	15:09	<180	6 - Circling	130	

Date	VP code	Survey ID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
14/08/2021	1	AU21_082	JM	1.AU21_082.1.1	OP	2	Adult	Unidentified	15:09	2	6 - Circling	130	Possibly on passage

Table A1-6
VP Target Species Flight Data (Sep 21 – Feb 22)

Date	VP_code	SurveyID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
06/09/2021	2	AU21_089	JM	2.AU21_089.1.1	K.	1	Adult	Female	14:23	6	10 - Other	55	Being mobbed by crows
06/09/2021	2	AU21_090	JM	2.AU21_090.1.1	GI	1	Adult	Female	17:45	35	1 - Foraging/hunting	45	
26/09/2021	1	AU21_099	JM	1.AU21_099.1.1	K.	1	Adult	Male	12:59	20	1 - Foraging/hunting	18	
26/09/2021	1	AU21_099	JM	1.AU21_099.2.1	K.	1	Adult	Male	14:53	30	1 - Foraging/hunting	28	Landed in a tree
04/10/2021	1	AU21_106	JM	1.AU21_106.1.1	PG	85	Unknown	Unidentified	11:27	40	3 - On passage	140	
04/10/2021	1	AU21_106	JM	1.AU21_106.2.1	PG	42	Unknown	Unidentified	12:08	35	3 - On passage	38	

Date	VP_code	SurveyID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
05/10/2021	2	AU21_108	JM	2.AU21_108.1.1	K.	1	Adult	Female	15:53	5	1 - Foraging/hunting	22	
05/10/2021	2	AU21_108	JM	2.AU21_108.2.1	K.	1	Adult	Unidentified	16:42	12	1 - Foraging/hunting	41	
06/10/2021	1	AU21_109	JM	1.AU21_109.1.1	PG	15	Unknown	Unidentified	08:16	40	3 - On passage	28	
06/10/2021	4	AU21_110	JM	4.AU21_110.1.1	PG	105	Unknown	Unidentified	10:43	150	3 - On passage	90	
06/10/2021	4	AU21_110	JM	4.AU21_110.2.1	PG	220	Unknown	Unidentified	11:00	50	3 - On passage	38	
06/10/2021	4	AU21_110	JM	4.AU21_110.3.1	PG	265	Unknown	Unidentified	11:02	75	3 - On passage	25	
07/10/2021	3	AU21_112	JM	3.AU21_112.1.1	K.	1	Adult	Female	11:11	20	1 - Foraging/hunting	72	
11/10/2021	3	AU21_114	PS	3.AU21_114.1.1	GJ	3	Adult	Unidentified	11:36	120	3 - On passage	139	
11/10/2021	3	AU21_114	PS	3.AU21_114.2.1	PG	250	Adult	Unidentified	12:12	180	3 - On passage	108	
11/10/2021	3	AU21_114	PS	3.AU21_114.3.1	GJ	30	Adult	Unidentified	12:22	130	3 - On passage	189	
11/10/2021	3	AU21_114	PS	3.AU21_114.4.1	SN	1	Adult	Unidentified	12:47	30	6 - Circling	49	

Date	VP_code	SurveyID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
13/10/2021	1	AU21_119	PS	1.AU21_119.1.1	PG	40	Adult	Unidentified	08:19	130	3 - On passage	159	
07/11/2021	2	AU21_124	JM	2.AU21_124.1.1	PG	45	Unknown	Unidentified	08:23	120	5 - To/from roost	145	
07/11/2021	2	AU21_124	JM	2.AU21_124.2.1	K.	1	Adult	Unidentified	10:02	15	1 - Foraging/hunting	28	
07/11/2021	2	AU21_125	JM	2.AU21_125.1.1	K.	1	Adult	Unidentified	11:17	20	1 - Foraging/hunting	70	
07/11/2021	2	AU21_125	JM	2.AU21_125.2.1	K.	1	Adult	Unidentified	11:31	20	1 - Foraging/hunting	28	
07/11/2021	2	AU21_125	JM	2.AU21_125.3.1	K.	1	Adult	Male	12:32	8	1 - Foraging/hunting	70	
07/11/2021	2	AU21_125	JM	2.AU21_125.4.1	K.	1	Adult	Male	12:38	8	1 - Foraging/hunting	55	
21/11/2021	4	AU21_127	JM	4.AU21_127.1.1	GJ	7	Adult	Unidentified	10:47	20	6 - Circling	30	
21/11/2021	3	AU21_128	JM	3.AU21_128.1.1	WS	3	Adult	Unidentified	15:18	30	5 - To/from roost	50	
22/11/2021	3	AU21_129	JM	3.AU21_129.1.1	GJ	30	Adult	Unidentified	09:13	25	6 - Circling	65	

Date	VP_code	SurveyID	Surveyor	GIS_ID	Species	Num Birds	Age	M/F/U	StartTime (hr:min)	Av flight height (m)	Flight behaviour	Flight duration (s)	Comment
22/11/2021	3	AU21_129	JM	3.AU21_129.2.1	GJ	35	Adult	Unidentified	09:50	40	6 - Circling	130	
22/11/2021	3	AU21_129	JM	3.AU21_129.3.1	HH	1	Adult	Male	10:01	6	1 - Foraging/hunting	25	
22/11/2021	3	AU21_129	JM	3.AU21_129.4.1	GJ	75	Adult	Unidentified	10:13	40	6 - Circling	55	
22/11/2021	4	AU21_130	JM	4.AU21_130.1.1	K.	1	Adult	Unidentified	11:54	15	1 - Foraging/hunting	60	
15/12/2021	2	AU21_132	JM	2.AU21_132.1.1	GJ	6	Adult	Unidentified	12:51	60	6 - Circling	150	GJ presumed to be flying between feeding areas

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