

FuturEnergy Ireland Ltd

# Cummeenabuddoge 2023/2024 Ornithology Surveys: Baseline Report

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COMMERCIAL IN CONFIDENCE



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## 1. Executive Summary

APEM Ltd (APEM) was commissioned by FuturEnergy Ireland to undertake bird surveys between December 2023 and August 2024 for the proposed Cummeenabuddoge Wind Farm, hereafter referred to as 'the Wind Farm Site', which is located in Co. Kerry, on the border with Co. Cork. APEM was requested to carry out additional surveys to update the baseline data for the Wind Farm Site and inform a future impact assessment. The Wind Farm Site is located approximately 4.3 km north of Ballyvourney, Co. Cork.

Ornithology surveys were undertaken to determine the ornithological baseline and to inform an assessment of potential effects arising from the proposed development. The main potential risks to birds arising from wind farms are direct habitat loss, disturbance and displacement, collision risk, and barrier effects. The survey scope was determined with reference to current NatureScot guidance, and the 'target species' included those which are Annex 1 listed and are of conservation concern, or which are more likely to be impacted by the proposed development.

The survey scope included Flight Activity Surveys (FAS) from a number of Vantage Points, Moorland Breeding Bird Surveys (MBBS) and Breeding Raptor Surveys. Flight activity was very low during FAS, with a total of just 37 flights recorded. The majority of records were of kestrel, which accounted for 24 flights. Six golden plover flights were also recorded, with flocks of up to 20 birds recorded during the non-breeding season only.

No target species were recorded breeding during the MBBS, while the only target raptor species found breeding was kestrel, with two territories identified. Territories for buzzard and sparrowhawk (all secondary species) were also identified, while a further secondary species raven was frequently recorded within the Survey Area. Flight activity for hen harrier was low, and no evidence of hen harriers breeding within the Breeding Raptor Survey Area was recorded.

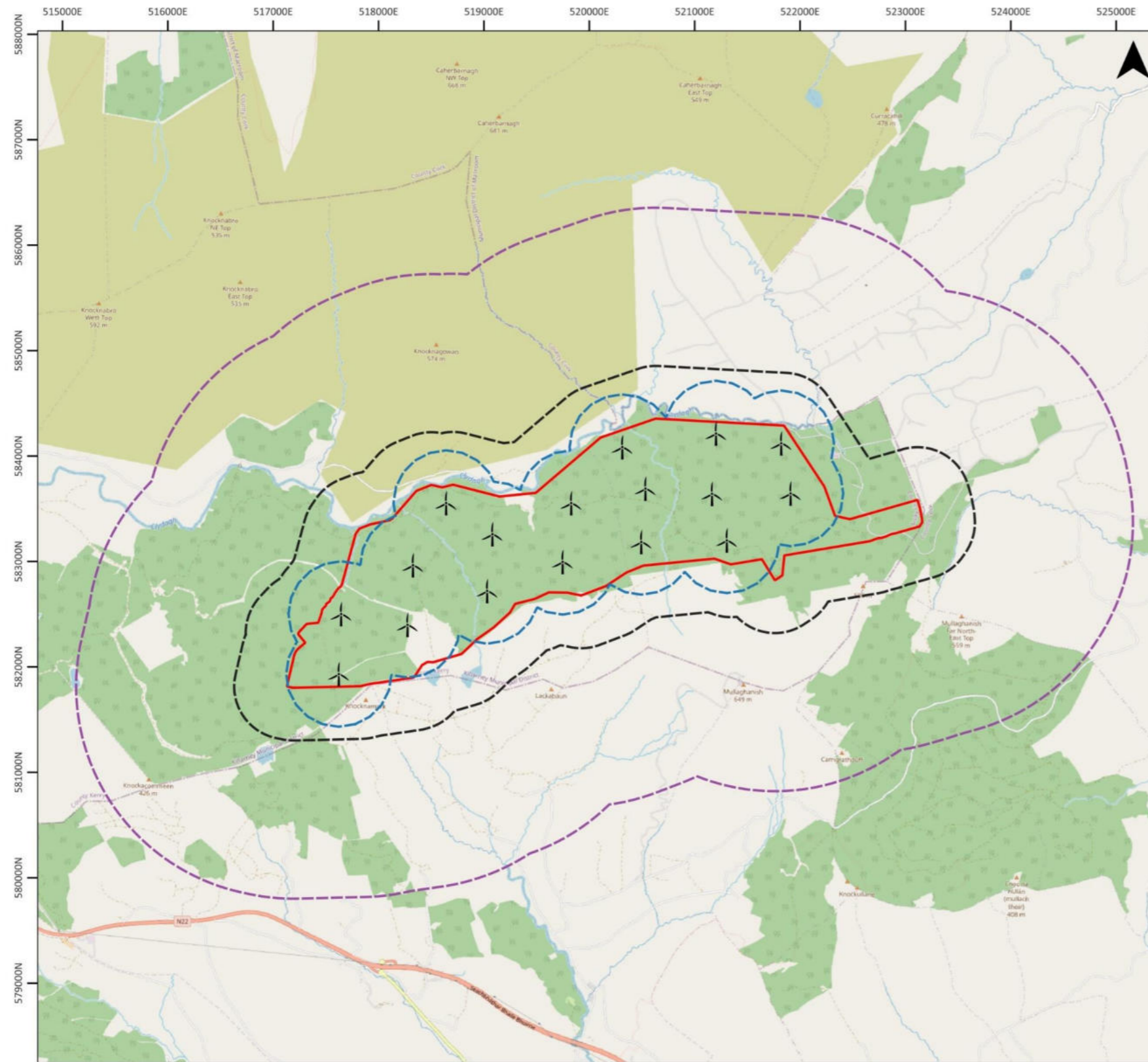
## 2. Introduction

### 2.1 Background

APEM Ltd (APEM) was commissioned by FuturEnergy Ireland to undertake bird surveys between December 2023 and August 2024 for the proposed Cummenabuddoge Wind Farm, hereafter referred to as 'the Wind Farm Site'. APEM was requested to carry out a year of surveys covering the breeding and non-breeding seasons to update the baseline data for the Wind Farm Site and inform a future impact assessment. The Wind Farm Site is located approximately 4.3 km north of Ballyvourney, Co. Cork. The Wind Farm Site Boundary is shown in **Figure 1**.

The Wind Farm Site has a central grid reference of W 20308 83117. Habitats within the Wind Farm Site are primarily commercial coniferous plantation and moorland. There are also two small waterbodies (Lough Gal and Lough Carrignamork), which are located adjacent to the southern boundary of the Wind Farm Site. The River Clydagh runs alongside the northern boundary of the Wind Farm Site, while two tributaries of this watercourse flow through the Wind Farm Site.

The wider area surrounding the Wind Farm Site comprises a mosaic of coniferous plantations and moorland, with further watercourses and waterbodies present. Two operational wind farms, Clydaghroe and Caherdowney, are located immediately south and north-east of the Wind Farm Site, respectively.








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**APEM** Group

**Cummeenabuddoge  
P00013291**

**The Wind Farm Site Boundary and  
Survey Areas**

Legend

-  Wind Farm Site Boundary
-  Turbine Layout
-  FAS Survey Area - 500m buffer of turbine layout
-  Moorland Breeding Bird Survey Area - 500m buffer of Wind Farm Site Boundary
-  Breeding Raptor Survey Area - 2km buffer of Wind Farm Site Boundary



0 1 2 3 km

Scale: 1: 50000      Date: 23/01/2025      Drawn by: AF

Coordinate System:  
IRENET95 / Irish Transverse  
Mercator



Basemap: Kartendaten: OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors.

**Figure 1 The Wind Farm Site Boundary and Survey Areas**



## 2.2 Purpose of the Report

Ornithology surveys were undertaken to determine the ornithological baseline and to inform an assessment of potential effects arising from the proposed development. The main potential risks to birds arising from wind farms are direct habitat loss, disturbance and displacement, collision risk, and barrier effects<sup>1</sup>.

A number of guidance documents have been produced relating to the assessment of impacts on birds from onshore wind farms. The key guidance used to inform the scope of surveys and reporting was published by NatureScot (2017)<sup>1</sup>, and is considered best practice for wind farm developments in Ireland. NatureScot guidance recommends that surveys should focus on a suite of 'target species' which are of higher importance (due to their legislative protection or conservation status) and are more susceptible to potential impacts from wind farms.

Target species for the Wind Farm Site were determined with reference to guidance<sup>1</sup>, qualifying species of designated sites with potential connectivity to the Wind Farm Site<sup>2</sup> and Irish legislation and conservation status. The target species selected for surveys are outlined in **Section 3**.

Species names used in this report follow common names as defined by BirdWatch Ireland (Birdwatch Ireland, 2021). A list of scientific names, as well as details of relevant legislation and conservation status of all bird species mentioned in this report is provided in Appendix 2. This report is supported by a separate Confidential Annex.

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<sup>1</sup> NatureScot (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms*, Version 2.

<sup>2</sup> NatureScot (2016) *Assessing Connectivity with Special Protection Areas (SPAs)*. Version 3.

## 3. Methods

### 3.1 Desk Study Methods

A desk-study was undertaken to identify statutory designated sites designated for ornithological features with potential connectivity to the Wind Farm Site. The desk-study searched for:

- Internationally important sites - Special Protection Areas (SPAs) and Ramsar sites within 20 km of the Wind Farm Site;
- Nationally important sites – Natural Heritage Areas (NHAs) within 20 km of the Wind Farm Site; and
- Nature Reserves within 10 km of the Wind Farm Site.

### 3.2 Field Survey Methods

Based on the habitats present at the Wind Farm Site and the ornithological sensitivities known to occur in the area, the 2023-2024 baseline ornithology survey scope comprised the following:

- Flight Activity Surveys (FAS) – December 2023 to August 2024
- Moorland Breeding Bird Surveys (MBBS) – April to July 2024; and
- Breeding Raptor Surveys – March to July 2024.

Surveys were undertaken to determine the activity of ‘target species’ within and surrounding the Wind Farm Site. Target species for the Wind Farm Site were determined following NatureScot (2017<sup>1</sup>) guidance, including qualifying species of designated sites with potential connectivity to the Wind Farm Site and considering Irish legislation and conservation status.

Full details of the methods followed during surveys are provided below. Survey methods followed current NatureScot (2017<sup>1</sup>) guidance and were undertaken by Paul Connaughton and Andre Robinson, who are both experienced field ornithologists with full knowledge of all survey methods and the local environment.

#### *Flight Activity Surveys*

FAS were carried out between December 2023 and August 2024, using a series of watches from three Vantage Point (VP) locations overlooking a 500m buffer of the proposed turbine layout to record flight activity of target bird species following NatureScot guidance. VPs were selected using viewshed analysis undertaken using Geographic Information Systems (GIS) and were ‘ground-truthed’ in the field to ensure that views were accurate. VP locations and viewsheds are shown in **Figure 2**.

The flight lines of all target species observed during the FAS were recorded on large-scale maps in the field. Target species during FAS were as follows:

- All wild swan, duck and goose species except mallard (*Anas platyrhynchos*);
- All diver (*Gavia sp.*) and grebe (*Podiceps sp.*) species;
- Hen harrier (*Circus cyaneus*) and all other raptor species<sup>3</sup> except buzzard (*Buteo buteo*) and sparrowhawk (*Accipiter nisus*);
- All wader species; and
- Any other qualifying interests of nearby SPAs and Ramsar sites.

Secondary species included the following: buzzard, sparrowhawk, raven (*Corvus corax*), mallard, all gull species, cormorant (*Phalacrocorax carbo*), grey heron (*Ardea cinerea*) and passerine species of conservation concern recorded in flocks of more than 100 individuals. Recording of target species took priority over that of secondary species.

Each recorded flight was numbered to allow for cross-referencing, with the following data recorded:

- Time on detection;
- Bird species, age and sex (where age and sex was determinable);
- Number of birds;
- Behaviour where applicable (e.g. foraging, commuting, display etc);
- Duration of flight within the VP viewshed; and
- Duration at each height band as follows:
  1. <10 m
  2. 10-20 m
  3. 20-200 m
  4. >200 m

Height bands were determined based on the proposed turbine model at the commencement of surveys. In addition to recording target species flights, the number and activity of 'secondary' species was recorded when secondary species were detected.

### 3.3 Survey Effort

In line with NatureScot (2017<sup>1</sup>) guidance, surveyors aimed to complete 36 hours of survey from each VP location during the breeding season (April-August) and non-breeding season (December to March) with 72 hours in total from each VP. Surveys were stratified to cover all times of day including dawn and dusk periods. Each watch lasted three hours with a 30-

<sup>3</sup> Owls have been included due to their nocturnal behaviour, which may cause them to be at greater risk of impacts from wind farms.

minute break in between watches. The following survey effort was completed from each VP location. A breakdown of monthly survey effort is shown in **Table 1**

**Table 1. Flight Activity Survey Effort (December 2023 to August 2024)**

Month and year	Number of survey hours		
	VP A	VP B	VP D
December 2023	6	6	6
January 2024	12	12	12
February 2024	12	12	12
March 2024	12	12	12
April 2024	6	6	3
May 2024	6	6	9
June 2024	6	6	12
July 2024	6	6	6
August 2024	6	6	6
<b>Total hours</b>	<b>72</b>	<b>72</b>	<b>78</b>

Full details of survey dates, times and hourly weather conditions are presented in **Table 5, Appendix 3**.

#### *Moorland Breeding Bird Surveys*

MBBS were undertaken between April and July 2024. The MBBS Survey Area covered the Wind Farm Site and a 500 m buffer. In line with NatureScot guidance (2017<sup>1</sup>), the survey used the Brown and Shepherd (1993) method designed to survey moorland species, with four survey visits completed.

The survey dates were as follows:

- Visit 1: 25/04/2024-02/05/2024;
- Visit 2: 30/05/2024-02/06/2024;
- Visit 3: 28/06/2024-30/06/2024;
- Visit 4: 26/07/2024-27/07/2024

Target species during surveys were non-passerine species of conservation concern breeding within open habitats. NatureScot (2017<sup>1</sup>) guidance states that survey of woodland and farmland passerines, especially in commercial coniferous forest or intensive agricultural land, is generally not required. All species of conservation concern were recorded during surveys, however passerine species are generally not subject to significant effects from wind farm developments and therefore were not considered target species. The MBBS Survey Area is shown in **Figure 1**.

### *Breeding Territory Analysis*

Following completion of all MBBS visits, all registrations of target species from field maps were digitised using GIS to determine the number and distribution of likely territories present within the Survey Area.

The method used to determine territories was informed by that described by Bibby (2000) and Gilbert *et al* (1998). A precautionary approach was followed, with a bird deemed to be holding a territory if breeding behaviour (e.g. singing, alarm-calling, adults carrying food, etc.) was observed, or if pairs of birds were observed in suitable habitat, during just one of the MBBS visits, alongside professional judgement.

### *Breeding Raptor Surveys*

Breeding Raptor Surveys were undertaken between March and August 2024 inclusive, with reference to the methods detailed in Hardey *et al.* (2013). Surveys covered a 2 km buffer of the Wind Farm Site (1 km for goshawk (*Accipiter gentilis*) and owls other than short-eared owl (*Asio flammeus*), 2km for hen harrier and other present raptors), with surveyors covering all areas of habitat suitable for breeding raptors.

Surveys involved completing a series of short watches over areas of suitable breeding habitat from suitable ad-hoc VP locations, and walkover surveys to identify any evidence of breeding. Although the surveys focused on recording target raptor species (Annex I species, raptors listed on Birds of Conservation Concern Ireland), 'secondary' species (buzzard, sparrowhawk and raven) were also recorded where present. Observations were recorded on large-scale field maps, with notes on behaviour taken where appropriate.

Survey dates were as follows:

- Visit 1: 28/03/2024-30/03/2024;
- Visit 2: 25/04/2024-05/05/2024;
- Visit 3: 18/05/2024-29/05/2024
- Visit 4: 30/06/2024-01/07/2024;
- Visit 5: 12/07/2024-01/08/2024

Individual survey dates can be found in **Appendix 3** .

The Breeding Raptor Survey Areas are shown in **Figure 1**.

### *Survey Limitations*

Access was limited to the Wind Farm Site Boundary, Coillte land and publicly accessible land. As far as possible, surveys were timed to coincide with suitable weather conditions, particularly during the breeding season, however periods of poor weather (e.g. rain, strong winds and reduced visibility) were at times encountered during the surveys. Surveying during

poor weather was unavoidable due to the number of surveys required and the frequent, inclement weather encountered, which included unforeseen showers.

As the majority of surveys were completed in optimal weather conditions it is considered that a small number of surveys undertaken in poor weather conditions are not a constraint. Furthermore, it is considered that surveying in a variety of conditions will be more representative of the baseline conditions and associated levels of bird activity within the Survey Areas. As such, sub-optimal weather is not considered to represent a constraint to the robustness of the data collected.

Due to health and safety issues regarding deer stalking and other shooting activities on Coillte land, the start of the survey programme was delayed with the first visit in December, rather than in September as planned. While this period is not generally associated with high levels of avian activity, there is a possibility that species passing through the Wind Farm Site on migration could have been missed. .

Due to deer stalking activities, there were also some minor restrictions on the timings of surveys at some VPs and the number of hours surveyed from each VP during the breeding season were reduced to 30 hours instead of the recommended 36. However, an additional 6 hours were surveyed from each VP during late March. FAS were carried out over a wide range of times across the survey period and these limitations are not considered to represent a constraint to the robustness of the data collected.

#### 4. Desk Study Results

During the desk-study four designated sites were identified. Details of statutory designated sites are provided in below.

**Table 2. Statutory sites designated for ornithological interests within 20 km of the Wind Farm Site**

Site Name	Designation	Qualifying Features	Distance from Wind Farm Site (at closest point)
Mullaghanish to Musheramore Mountains	SPA	<ul style="list-style-type: none"> <li>Hen harrier (breeding)</li> </ul>	0.6 km east
Boggeragh Mountains	NHA	<ul style="list-style-type: none"> <li>Golden Plover <i>Pluvialis apricaria</i> (non-breeding)</li> </ul>	14 km north-east
The Gearagh	SPA	<ul style="list-style-type: none"> <li>Wigeon <i>Mareca penelope</i></li> <li>Teal <i>Anas crecca</i></li> <li>Mallard</li> <li>Coot <i>Fulica atra</i></li> </ul>	14.6 km south-east

Site Name	Designation	Qualifying Features	Distance from Wind Farm Site (at closest point)
Killarney National Park	SPA	<ul style="list-style-type: none"> <li>Merlin <i>Falco columbarius</i> (breeding)</li> <li>Greenland white-fronted goose <i>Anser albifrons</i> (non-breeding)</li> </ul>	19.3 km west

## 5. Survey Results

### 5.1 Flight Activity Surveys

#### Target Species Flights

A total of 37 flights by five identified target species were recorded during FAS. Kestrel (*Falco tinnunculus*) was the species recorded most frequently with a total of 24 flights, followed by golden plover (6 flights) and hen harrier (3 flights). A summary of all target species flights recorded during the FAS, broken down by species, is provided in

**Table 3.** Full details of target species flights are presented in **Appendix 4** and flight lines are shown in **Appendix 1**.

Flight activity for all species was extremely low, other than kestrel. Kestrel was regularly recorded during surveys, particularly hunting over areas of open ground, but flights were also recorded over woodland. Golden plover was only recorded during the non-breeding season between January and March with flocks of up to 20 birds observed over the open moorland habitat outside the Wind Farm Site Boundary. There is no suitable golden plover foraging habitat within the Wind Farm Site Boundary.

Despite nearby populations at the Mullaghanish to Musheramore Mountains SPA (Table 2), hen harrier was recorded infrequently during FAS with just two non-breeding season flights and a single flight observed during the breeding season. Adult males were recorded in January and February with birds seen hunting in suitable habitat south of the Wind Farm Site. One of these birds was also observed flying over woodland close to Lough Carrignafurark, approximately 620 m south-east of the Wind Farm Site. A juvenile was recorded foraging close to VP A around 0.5km south of the Wind Farm Site Boundary during August FAS. All activity was recorded to the south of the Wind Farm Site and was generally associated with open moorland habitat, although one flight was registered above woodland close to Lough Carrignafurark.

Two flights were recorded of an accipiter species with the surveyor unable to rule out goshawk (amber-listed), which is a very rare breeding species in Ireland.

**Table 3. Summary of Target Species Flights Recorded during 2023-24 FAS**

Species*	Conservation Status**	Non-breeding season	Breeding Season	Total	Number of birds per flight
Stock dove	Red	0	1	1	10
Golden Plover	Ann I, Red	6	0	6	1-20
Snipe	Red	1	0	1	1
Accipiter species***		2	0	2	1
Hen Harrier	Ann I, Amber	2	1	3	1
Kestrel	Red	5	19	24	1-2
<b>Total</b>		<b>16</b>	<b>21</b>	<b>37</b>	
<p>* Species names and order follow the Irish List maintained by the IRBC.  **Ann I = listed on Annex I of the Bird's Directive; Amber = Bird of Conservation Concern in Ireland Amber-listed species; Red = Bird of Conservation Concern in Ireland Red-listed species  ***Sparrowhawk or Goshawk.</p>					

### Secondary Species

Four secondary species were recorded during the FAS, with raven recorded during the majority of surveys and sparrowhawk and buzzard recorded occasionally. There was also a single record of lesser black-backed gull (*Larus fuscus*). Secondary species were generally recorded as single birds or in low numbers of fewer than five birds per record. However, a flock of 18 lesser black-backed gull was recorded in August.

### Incidental Records

There were some additional records of target species flights recorded during surveys which were further than 2 km from the VPs and therefore treated as incidental. These records mostly related to kestrel, with one incidental flock of golden plover recorded.

## 5.2 Moorland Breeding Bird Surveys

### Target Species

A single mallard was the only target species recorded during MBBS. No non-passerine species of conservation concern were recorded breeding within the MBBS Survey Area.

A single snipe flight was recorded during FAS at the end of March. As the Wind Farm Site is dominated by coniferous plantation, there is very little suitable habitat for breeding waders within the Wind Farm Site.

### 5.3 Breeding Raptor Surveys

#### *Annex 1 Raptor Species*

Hen harrier was the only Annex 1 raptor species recorded during Breeding Raptor Surveys, with an adult male and a juvenile recorded in August at Lackabaun, the birds were recorded approximately 195 m south of the Wind Farm Site. However, the lack of records between March and July is a strong indication that there are no breeding territories within the Survey Area and that the Wind Farm Site is not of significant importance for foraging birds.

#### *Other Target Raptor Species*

Kestrel was the only other target raptor species recorded, with birds recorded regularly during FAS as well as during Breeding Raptor Surveys. Although no nests were located, evidence of breeding behaviour was recorded, and two territories were identified within the Breeding Raptor Survey Area. Most activity was around the woodland margins, but a concentration of flight activity was also recorded over woodland habitat close to Lough Carrignafurark, approximately 885 m south of the Wind Farm Site. With pairs of birds observed frequently in this area, a breeding territory was identified here, approximately 200 m south of the Wind Farm Site Boundary. A further territory was present just inside the northern Wind Farm Site Boundary, with juvenile birds observed late in the season, which confirmed successful breeding. Breeding raptor territories are shown on **Figure 5**.

#### *Secondary Raptor Species*

Three secondary species were observed during the Breeding Raptor Surveys: buzzard, sparrowhawk and raven. Registrations of these species are briefly summarised below:

- **Buzzard:** Occasionally recorded, with at least one territory within the Breeding Raptor Survey Area, but little activity recorded within the Wind Farm Site, although there is an abundance of suitable breeding habitat.
- **Sparrowhawk:** Occasionally recorded, with at least one territory likely within the Breeding Raptor Survey Area. There is an abundance of suitable breeding habitat within the Wind Farm Site and Survey Area.
- **Raven:** Frequently recorded, but no breeding territories identified. There is an abundance of suitable breeding habitat within the Wind Farm Site and Breeding Raptor Survey Area.

## 6. Summary of Key Findings

Flight activity was very low during 2023/24 FAS, with a total of just 37 flights recorded. The majority of records were of kestrel, with a total of 24 flights. Kestrel was regularly recorded foraging over open ground close to the woodland margins. The next most frequently recorded species was golden plover. Six flights of up to 20 birds were recorded, some of which were in March during the spring migration period.

Hen harrier flight activity was low, and there was no evidence of any breeding hen harrier within the Breeding Raptor Survey Area. The very low levels of activity recorded indicate that the Wind Farm Site and surrounding areas are used very infrequently by foraging birds which are likely to breed within beyond the Breeding Raptor Survey Area.

No target species were recorded breeding during the MBBS, while the only target raptor species found breeding was kestrel, with two territories identified. Territories for buzzard and sparrowhawk (both secondary species) were also identified, while a further secondary species raven was also frequently recorded within the Survey Area.

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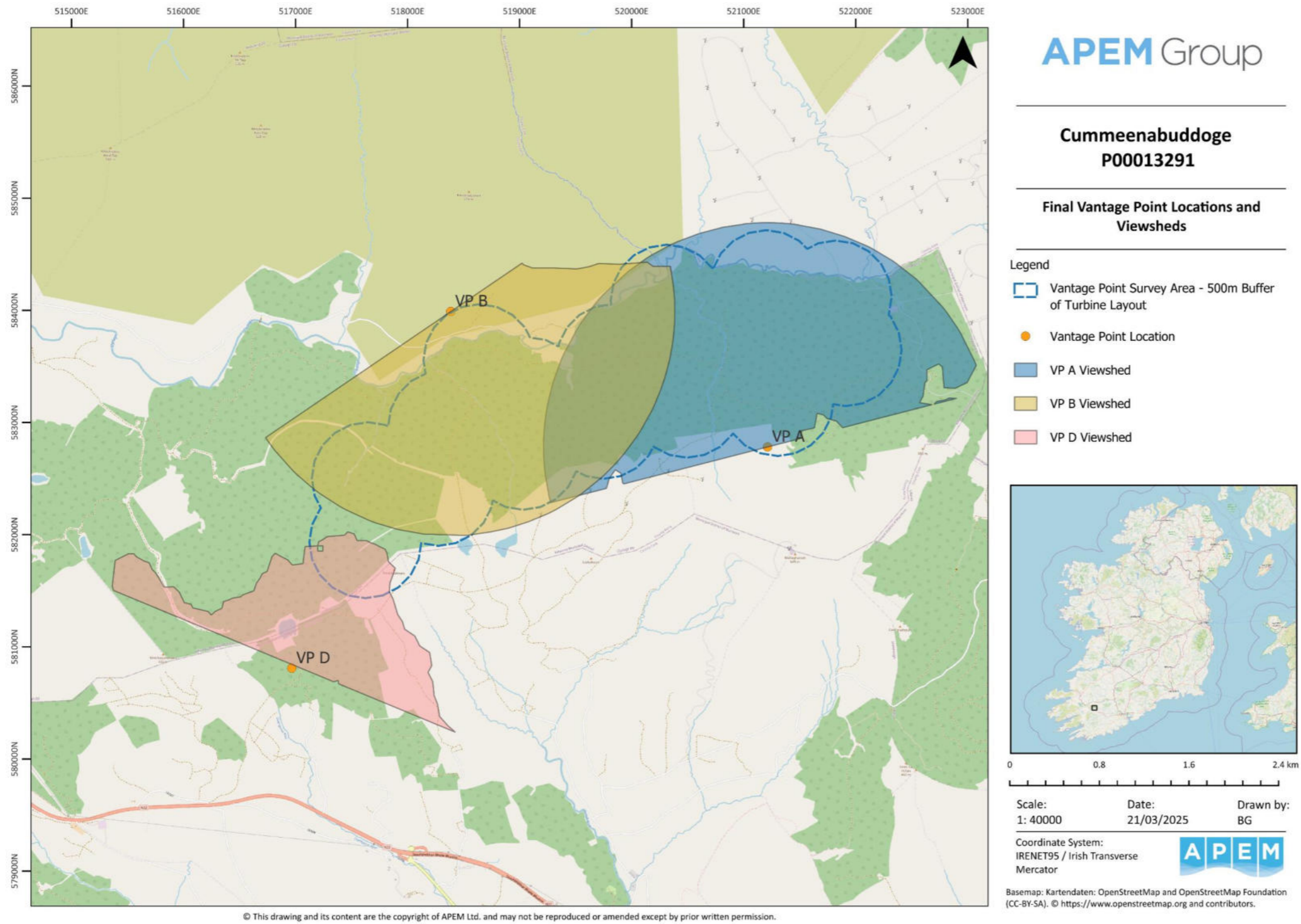
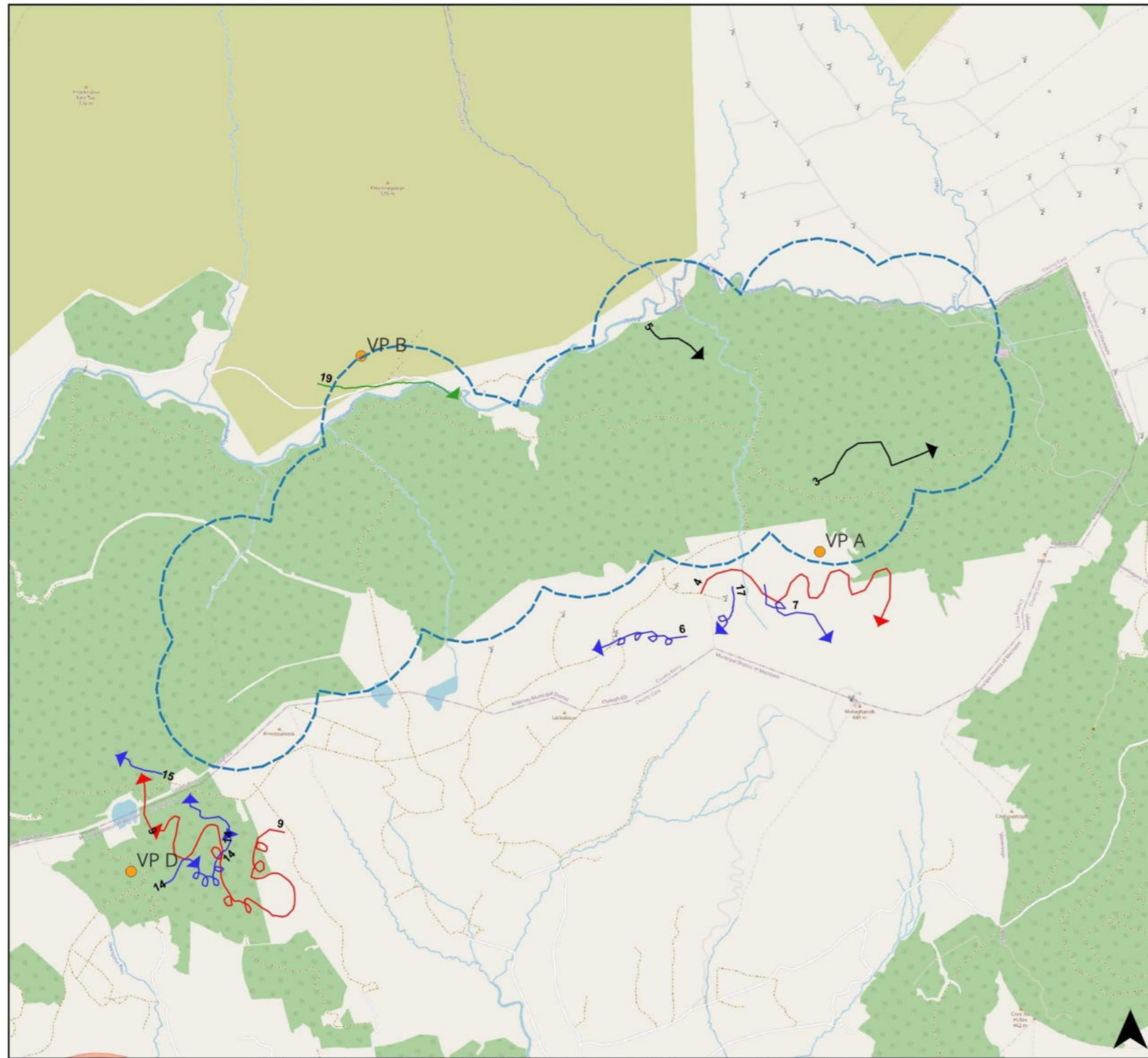


Figure 2. Final Vantage Point locations and their respective viewsheds. Viewsheds were calculated at 15m surface offset.



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**Legend**

-  Vantage Point Survey Area - 500m Buffer of Turbine Layout
-  Golden Plover Flight Lines
-  Hen Harrier Flight Lines
-  Kestrel Flight Lines
-  Accipiter Species Flight Lines
-  Snipe Flight Lines



Scale: 1: 33175      Date: 24/01/2025      Drawn by: AF




Coordinate System: IRENET95 / Irish Transverse Mercator

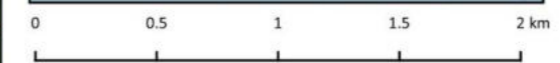
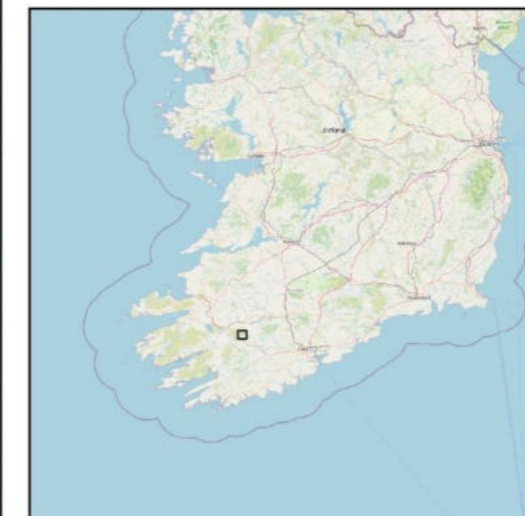


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**Figure 3. Non-breeding season FAS**

**Legend**

-  Vantage Point Survey Area - 500m Buffer of Turbine Layout
-  Hen Harrier Flight Lines
-  Kestrel Flight Lines

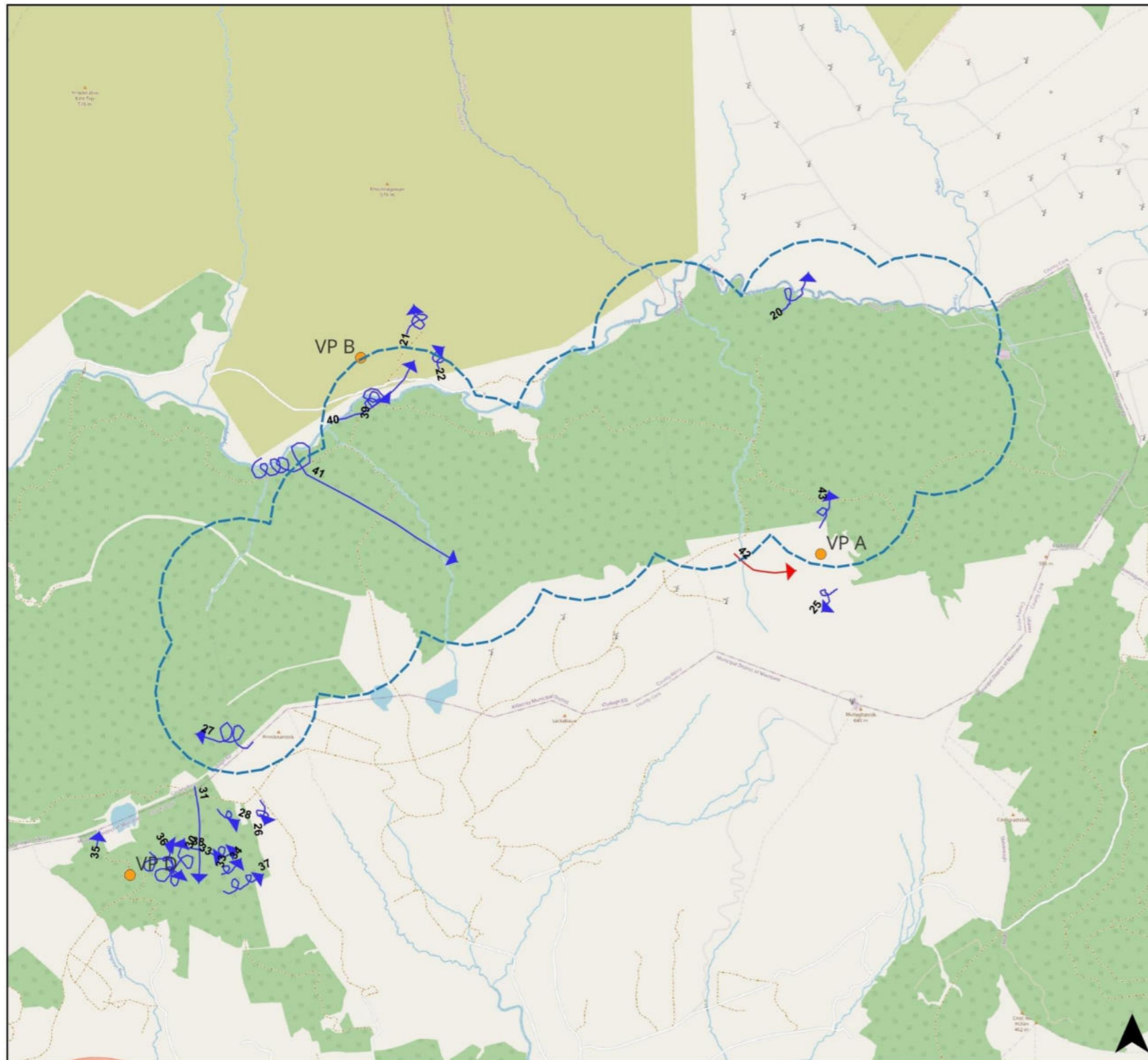


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IRENET95 / Irish Transverse  
Mercator

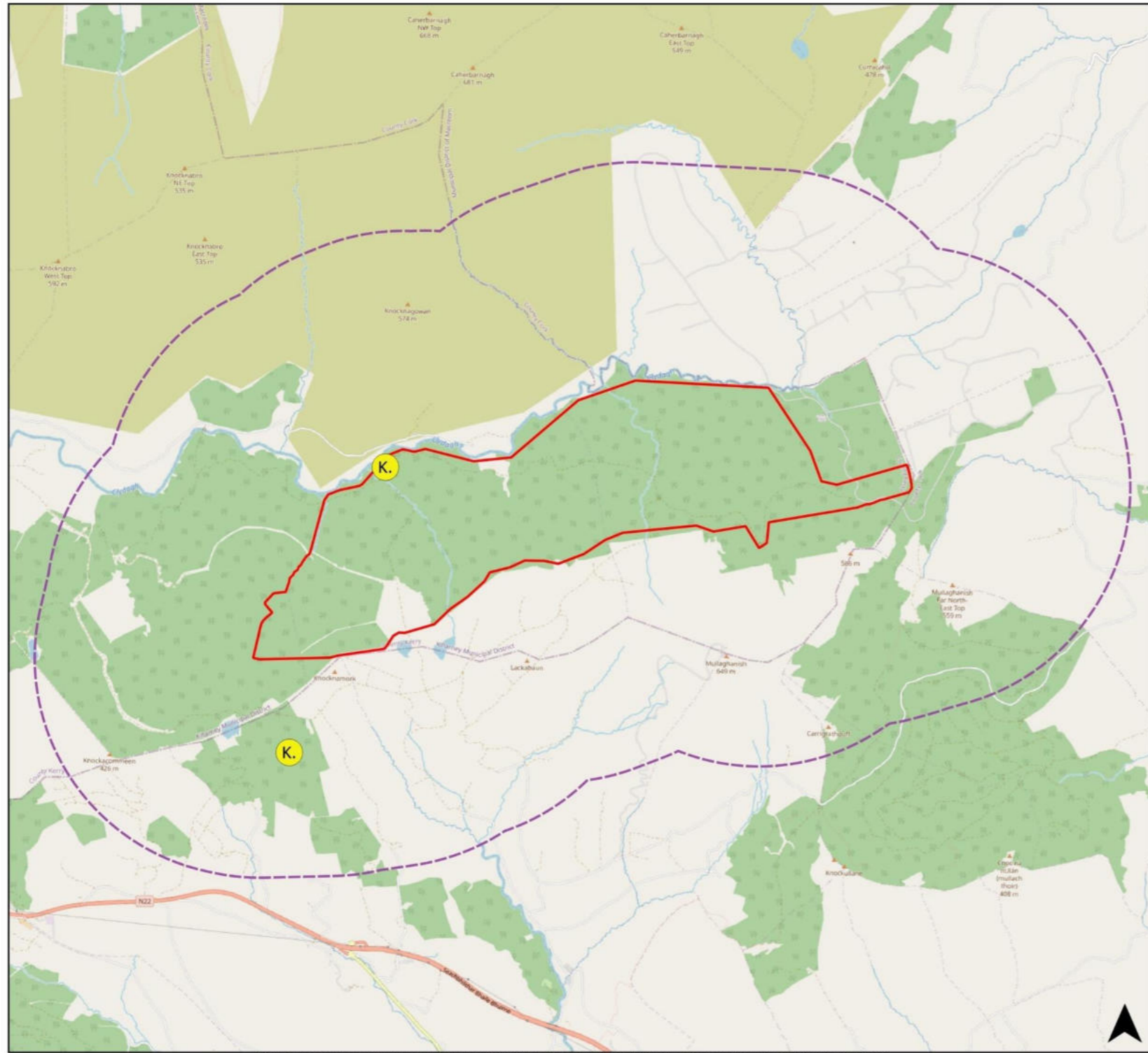


Basemap: Kartendaten: OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors.



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**Figure 4. Breeding season FAS**



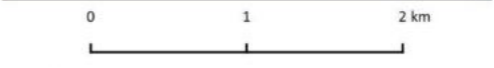
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**APEM** Group

**Cummeenabuddoge**  
P00013291

**Breeding Raptor Surveys:**  
**Breeding Raptor Territories**

- Legend**
- Wind Farm Site Boundary
  - Raptor Survey Area - 2km Buffer of Wind Farm Site Boundary
  - K. Kestrel Breeding Territories



Scale: 1: 49000      Date: 24/01/2025      Drawn by: AF

Coordinate System: IRENET95 / Irish Transverse Mercator



Basemap: Kartendaten: OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © <https://www.openstreetmap.org> and contributors.

**Figure 5. Breeding territories for all species recorded during 2024 Breeding Raptor Surveys**



## Appendix 2 Species List

Table 4 provides English vernacular and scientific names for all bird species named within this report. Taxonomic order is based on the Irish List by IRBC. **Bookmark not defined..**

**Table 4. List of Species mentioned within this report**

English common name	BirdWatch Ireland Species Name	Scientific name	Annex 1 Listing *	BoCCI Conservation Status**
Greenland white-fronted goose	Greenland white-fronted goose	<i>Anser albifrons</i>		Amber
Wigeon	Eurasian wigeon	<i>Mareca penelope</i>		Amber
Mallard	Mallard	<i>Anas platyrhynchos</i>		Amber
Teal	Eurasian teal	<i>Anas crecca</i>		Amber
Stock dove	Stock dove	<i>Columba oenas</i>		Red
Coot	Eurasian coot	<i>Cearc cheannann</i>		Amber
Golden plover	Golden plover	<i>Pluvialis apricaria</i>	Ann1	Red
Snipe	Snipe	<i>Gallinago gallinago</i>		Red
Lesser black-backed gull	Lesser black-backed gull	<i>Larus fuscus</i>		Amber
Cormorant	Great cormorant	<i>Phalacrocorax carbo</i>		Amber
Grey heron	Grey heron	<i>Ardea cinerea</i>		Green
Sparrowhawk	Eurasian Sparrowhawk	<i>Accipiter nisus</i>		Green
Goshawk	Northern goshawk	<i>Accipiter gentilis</i>		Amber
Hen Harrier	Hen harrier	<i>Circus cyaneus</i>	Ann1	Amber
Buzzard	Buzzard	<i>Buteo buteo</i>		Green
Short-eared owl	Short-eared owl	<i>Asio flammeus</i>	Ann1	Amber
Kestrel	Kestrel	<i>Falco tinnunculus</i>		Red
Merlin	Merlin	<i>Falco columbarius</i>	Ann1	Amber
Raven	Northern Raven	<i>Corvus corax</i>		Green

\*Ann 1 = listed on Annex I of the Bird's Directive;  
 \*\*Green = Bird of Conservation Concern Ireland Green-listed species; Amber = Bird of Conservation Concern Ireland Amber-listed species; Red = Bird of Conservation Concern Ireland Red-listed species.

## Appendix 3 Weather Data

**Table 5. Survey times and weather conditions during 2023/24 FAS**

Survey	Date	Time	Temperature (Celsius)	Wind (Beaufort scale and direction)	Visibility	Precipitation	Cloud Cover
<b>VP A</b>							
1	08/12/2023	10:00-13:00	8	F4 SW	>2km	Drizzle, Showers	8
1	08/12/2023	13:30-16:30	7	F5 SW	>2km	Heavy Showers	7
2	06/01/2024	09:00-12:00	0	F1 NW	>3km	None	2
2	06/01/2024	12:30-15:30	2	F1 NW	>3km	None	2
3	18/01/2024	11:00-14:00	-2	F1 NW	>3km	None	1
3	18/01/2024	14:30-17:30	0	F1 NW	>3km	None	1
4	09/02/2024	11:00-14:00	9	F3 NW	>3km	Light Showers	7
4	09/02/2024	14:30-17:30	9	F3 NW	>3km	None	8
5	18/02/2024	12:00-15:00	13	F6 WNW	>3km	None	7
5	18/02/2024	08:30-11:30	9-13	F4 WNW	>2km	Light Drizzle	7-8
6	19/03/2024	06:30-09:30	6	F1 SSW	>3km	Light showers	8
6	19/03/2024	10:00-13:00	9	F2 SW	>3km	Light showers	8
7	28/03/2024	13:00-16:00	11	F3 N	>3km	None	7
7	28/03/2024	16:30-19:30	11	F2 NE	>3km	None	6
8	17/04/2024	13:30-16:30	10	F6 NW	>3km	Occasional drizzle	8
8	22/04/2024	13:15-16:15	16	F5 NNW	>3km	None	4-6
9	17/05/2024	14:00-17:00	15	F6 N	>3km	Drizzle	8
9	17/05/2024	17:30-20:30	12-15	F6 NW	>3km	None	8
10	19/06/2024	12:00-15:00	16	F5 - F7 N	>3km	None	6

Survey	Date	Time	Temperature (Celsius)	Wind (Beaufort scale and direction)	Visibility	Precipitation	Cloud Cover
10	19/06/2024	08:30-11:30	12	F6-6 N	>3km	None	6-7
11	12/07/2024	13:00-16:00	16	F7 N	>3km	None	8
11	12/07/2024	09:30-12:30	14-16	F7 N	>3km	Light drizzle during first hour	8
12	09/08/2024	15:00-18:00	20	F6 WSW	>3km	None	7
12	07/08/2024	12:15-15:15	17	F6 WSW	>3km	Light drizzle at times	8
<b>VP B</b>							
1	07/12/2023	10:30-13:30	3	F4 SW	>3km	Heavy showers	6
1	07/12/2023	14:00-17:00	7	F4 SW	>3km	Heavy Showers	6
2	08/01/2024	10:45-13:45	2	F3 E	>3km	Light Showers	5
2	08/01/2024	14:15-17:15	1	F3 E	>3km	Light Showers / Sleet	7
3	19/01/2024	10:00-13:00	-1	F2 S	>3km	None	3
3	19/01/2024	13:30-16:30	2	F3 S	>3km	None	5
4	08/02/2024	11:30-14:30	5	F3 SE	>3km	Light Showers	6
4	08/02/2024	08:00-11:00	4	F4 E	>3km	Light Showers	7
5	19/02/2024	12:00-15:00	12	F6 WSW	>3km	None	8
5	19/02/2024	15:30-18:30	8-11	F6 WSW	>3km	None	6-7
6	14/03/2024	11:00-14:00	9	F4 SW	>3km	Light showers	7
6	14/03/2024	14:30-17:30	11	F4 SW	>3km	Heavy showers	8
7	30/03/2024	12:30-15:30	11	F4 S	>3km	None	6
7	30/03/2024	16:00-19:00	10	F3 SE	>3km	None	5
8	12/04/2024	07:30-10:30	10	F6 S	>3km	Drizzle	8
8	12/04/2024	11:00-14:00	11	F6 S	>3km	Drizzle at times	8
9	31/05/2024	09:00-12:00	14-17	F6 NW	>3km	None	3
9	31/05/2024	12:30-15:30	17	F5 NW	>3km	None	3
10	23/06/2024	09:30-12:30	14	F4 NNW	>3km	None	8
10	23/06/2024	06:00-09:00	8-11	F4 NNW	>3km	None	6-8

Survey	Date	Time	Temperature (Celsius)	Wind (Beaufort scale and direction)	Visibility	Precipitation	Cloud Cover
11	22/07/2024	17:00-20:00	18-20	F5 SW	>3km	None	7
11	22/07/2024	13:30-16:30	20	F4 SW	>3km	None	8
12	10/08/2024	14:00-17:00	21	F4 W	>3km	None	6
12	10/08/2024	10:30-13:30	18-21	F4 W	>3km	None	6
<b>VP D</b>							
1	11/12/2023	08:30-11:30	8	F4 SW	<1km	Rain Low Clouds	8
1	11/12/2023	12:00-15:00	10	F4 SW	<1km	Rain Low Clouds	8
2	11/01/2024	10:30-13:30	0	F2 NE	>3km	None	5
2	11/01/2024	14:00-17:00	3	F2 NE	>3km	None	3
3	20/01/2024	09:00-12:00	8	F4 SW	>2km	Heavy Showers, Drizzle	8
3	20/01/2024	12:30-15:30	8	F4 SW	>2km	Drizzle	8
4	09/02/2024	07:30-10:30	7	F3 N	>3km	Heavy Showers	8
4	08/02/2024	15:00-18:00	7	F3 SE	>3km	Light Showers	7
5	27/02/2024	12:00-15:00	12	F3 SW	>3km	Showers	6
5	27/02/2024	15:30-18:30	12	F2 W	>3km	None	5
6	20/03/2024	07:00-10:00	5	F4 NW	>2km	Heavy showers	8
6	20/03/2024	10:30-13:30	6	F4 NW	>2km	Light showers	8
7	29/03/2024	07:00-10:00	8	F2 SW	>3km	None	5
7	29/03/2024	10:30-13:30	13	F2 SW	>3km	None	4
8	30/04/2024	11:15-14:15	10	F5 S	>3km	Showers	8
8	01/05/2024	13:30-16:30	11	F6	>3km	None	6-7
9	24/05/2024	07:00-10:00	6-11	F3 WNW	>3km	None	7-8
9	24/05/2024	10:30-13:30	11	F3 WNW	>3km	None	8
10	28/06/2024	13:00-16:00	16	F1 W	>3km	None	6
10	28/06/2024	16:30-19:30	17	F2 W	>3km	Light rain	6-8
10	28/06/2024	13:00-16:00	16	F1 W	>3km	None	6

Survey	Date	Time	Temperature (Celsius)	Wind (Beaufort scale and direction)	Visibility	Precipitation	Cloud Cover
10	28/06/2024	16:30-19:30	17	F2 W	>3km	Light Rain	6-8
11	29/07/2024	12:00-15:00	16	F4 SSW	>3km	None	8
11	29/07/2024	08:30-11:30	16	F6 SSW	>2km	Light showers first hour	8
12	29/08/2024	14:30-17:30	16	F5 W	>3km	None	8
12	29/08/2024	11:00-14:00	16	F6 W	>3km	None	7

**Table 6. Survey times and weather conditions during 2024 MBBS**

Survey visit	Date	Time	Temperature (Celsius)	Wind (Beaufort scale and direction)	Visibility	Precipitation	Cloud Cover
1	25/04/2024	05:50-10:50	5	F2 SW	<1km	Heavy showers	8
1	01/05/2024	06:00-12:00	5	F1 SE	<1km	Heavy showers	8
1	02/05/2024	06:00-10:00	4	F3 NW	>3km	Heavy showers	8
2	30/05/2024	06:00-08:00	8	F4 N	<1km	Heavy showers	8
2	31/05/2024	06:00-10:00	8	F4 NW	>3km	None	2
2	02/06/2024	06:00-13:00	13	F3 NW	>3km	None	4
3	28/06/2024	06:00-10:00	10	F3 W	>3km	None	4
3	29/06/2024	05:30-08:30	9	F3 S	>1km	Heavy showers	8
3	30/06/2024	05:30-11:30	7	F5 NW	>2km	Light Showers	6-8
3	28/06/2024	06:00-10:00	10	F3 W	>3km	None	4
4	27/07/2024	05:30-11:30	10	F1 S	>3km	None	8
4	26/07/2024	06:00-12:00	11	F1 SW	>3km	Light showers	7

**Table 7. Survey times and weather conditions during 2024 Breeding Raptor Surveys**

Survey	Date	Time	Temperature (Celsius)	Wind (Beaufort scale and direction)	Visibility	Precipitation	Cloud Cover
1	28/03/2024	07:00-13:00	6	F3 NE	>3km	None	4
1	30/03/2024	05:45-11:45	6	F4 SE	>3km	Light showers	6
2	25/04/2024	12:00-18:00	10	F1 SW	>2km	Drizzle	8
2	26/04/2024	11:30-14:30	6	F2 NE	>3km	None	6
2	26/04/2024	14:30-17:30	6	F2 NE	>3km	None	6
2	30/04/2024	15:15-18:15	11	F5 S	>3km	Heavy showers	8
2	01/05/2024	10:00-13:00	10	F6 SE	>3km	Light showers	8
2	05/05/2024	13:00-16:00	14	F4 NE	>3km	None	7
2	05/05/2024	16:30-19:30	14	F4 NE	>3km	None	6
3	18/05/2024	08:30-11:30	13	F6 NW	>3km	None	8
3	23/05/2024	07:00-10:00	10	F7 NNW	>3km	Heavy shower	8
3	23/05/2024	14:00-17:00	11	F6 NW	>3km	None	8
3	28/05/2024	10:30-13:30	11	F6 NNW	>3km	None	8
3	28/05/2024	14:30-17:30	14	F3 SW	>3km	Light showers	7
3	29/05/2024	10:30-13:30	13	F3 NW	>3km	Light showers	7
3	29/05/2024	14:00-17:00	14	F3 NW	>3km	Light showers	7
4	19/06/2024	15:30-18:30	16	F7 North	>3km	None	7
4	19/06/2024	12:00-15:00	16	F6-F7 N	>3km	None	6
4	19/06/2024	08:30-11:30	12	F6-F7 N	>3km	None	6
4	22/06/2024	11:00-14:00	15	F4 SW	>3km	None	6-7
4	22/06/2024	06:30-09:30	12	F4 SW	>3km	None	8
4	23/06/2024	13:00-16:00	18	F3 WNW	>3km	None	7
4	23/06/2024	06:00-09:00	8-11	F4 NNW	>3km	None	6-8
4	23/06/2024	09:30-12:30	14	F4 NNW	>3km	None	8

Survey	Date	Time	Temperature (Celsius)	Wind (Beaufort scale and direction)	Visibility	Precipitation	Cloud Cover
4	30/06/2024	12:30-15:30	11	F3 NW	>3km	Light showers	7
4	01/07/2024	07:00-10:30	9	F3 NW	>3km	Light showers	7
4	01/07/2024	11:30-14:30	10	F3 W	<1km	Light showers	7
4	01/07/2024	15:00-18:00	13	F4 W	>2km	Light showers	8
5	12/07/2024	16:30-19:30	16	F7 N	>3km	None	8
5	27/07/2024	15:30-18:30	19	F5 NW	>3km	None	7
5	27/07/2024	12:00-15:00	17 - 19	F5 WNW	>3km	None	7
5	27/07/2024	08:30-11:30	15 - 17	F6 WNW	>3km	None	7-8
5	27/07/2024	12:00-15:00	18	F2 NW	>3km	None	5
5	01/08/2024	17:15-20:15	18	F2 SW	>3km	None	6
5	01/08/2024	13:45-16:45	22	F1 WSW	>3km	None	5
5	01/08/2024	09:30-12:30	20	F1 WSW	>3km	None	5

## Appendix 4 Details of Target Species Flight Lines

Details of target species flight lines recorded during 2023/24 FAS are presented below in **Table 8**. The Flight ID allows for cross-referencing of flights shown on Figure 3 and Figure 4, Appendix 1.

**Table 8. Details of non-confidential target species flight lines recorded during FAS**

Species	Flight ID	Date	VP	Count	Time	Flight Duration	Height Bd	Age*	Sex	Notes
Stock dove	32	12/04/2024	B	10	09:06	20	C			Flying east
Golden plover	1	06/01/2024	A	1	13:18	90	C			
	2	11/01/2024	D	20	12:53	135	C			
	8	18/02/2024	A	4	10:46	0	C			
	10	19/03/2024	A	14	10:26	90	B			
	11	19/03/2024	A	12	10:51	30	A			
	12	19/03/2024	A	12	12:05	40	B			
Snipe	19	30/03/2024	B	1	18:37	30	B			Flying
Kestrel	20	09/02/2024	A	1	10:29	180	B			Hunting
	21	10/02/2024	A	1	12:22	60	A			Hunting
	22	28/03/2024	A	1	15:38	20	A			Hunting
	25	29/03/2024	D	1	09:53	20	A		M	Hunting
	26	29/03/2024	D	1	09:53	60	B		M	Hunting
	27	29/03/2024	D	1	09:53	20	A		M	Hunting
	31	29/03/2024	D	1	09:58	20	A		M	Flying
	28	17/04/2024	A	1	15:07	60	C		M	Hunting
	30	12/04/2024	B	1	12:06	60	B		F	Hunting
	33	12/04/2024	B	1	12:26	30	B		F	Hunting
	33	17/05/2024	A	1	18:06	120	C		M	Hunting

Species	Flight ID	Date	VP	Count	Time	Flight Duration	Height Bd	Age*	Sex	Notes
	34	29/07/2024	D	1	12:06	30	C		F	Hunting
	35	29/07/2024	D	1	13:20	20	C			Soaring
	36	29/07/2024	D	1	11:06	10	B		M	Flying
	37	29/07/2024	D	1	08:59	90	C		F	Hunting
	38	29/07/2024	D	1	10:38	300	C			Hunting
	39	29/08/2024	D	1	14:37	10	B		F	Hunting
	40	29/08/2024	D	1	14:37	60	C		F	Hunting
	41	29/08/2024	D	1	15:21	300	C		F	Hunting
	43	29/08/2024	D	1	16:08	10	B			
	20	29/08/2024	D	1	16:39	60	C			Hunting
	21	29/08/2024	D	1	12:06	60	C		F	Hunting
	22	29/08/2024	D	1	13:13	20	C			Flying
	25	10/08/2024	B	2	15:20	60	B	Juv		Circling and landing on plantation
	26	10/08/2024	B	1	12:40	20	B			Hunting,
	27	10/08/2024	B	1	13:25	60	C		F	Soaring
31	07/08/2024	A	1	14:37	30	B		F	Hunting	
Sparrowhawk	23	12/04/2024	B	1	13:22	5	B			
	32	22/07/2024	B	1	14:23	20	C		F	
Accipiter Species	3	18/01/2024	A	1	11:28	15	A			Accipiter sp. Goshawk observation was not ruled out
	5	19/01/2024	B	1	10:40	10	B			Sparrowhawk or goshawk.
Hen harrier	4	18/01/2024	A	1	16:01	110	B	Adult	M	Hunting
	9	27/02/2024	D	1	10:46	120	C	Adult	M	being Mobbed by Hooded crow
	9	27/02/2024	D	1	10:46	10	B	Adult	M	Flew out of sight
	42	07/08/2024	A	1	12:34	15	A	Juvenile		Hunting

\*Imm = immature, Juv – juvenile, CY = calendar year