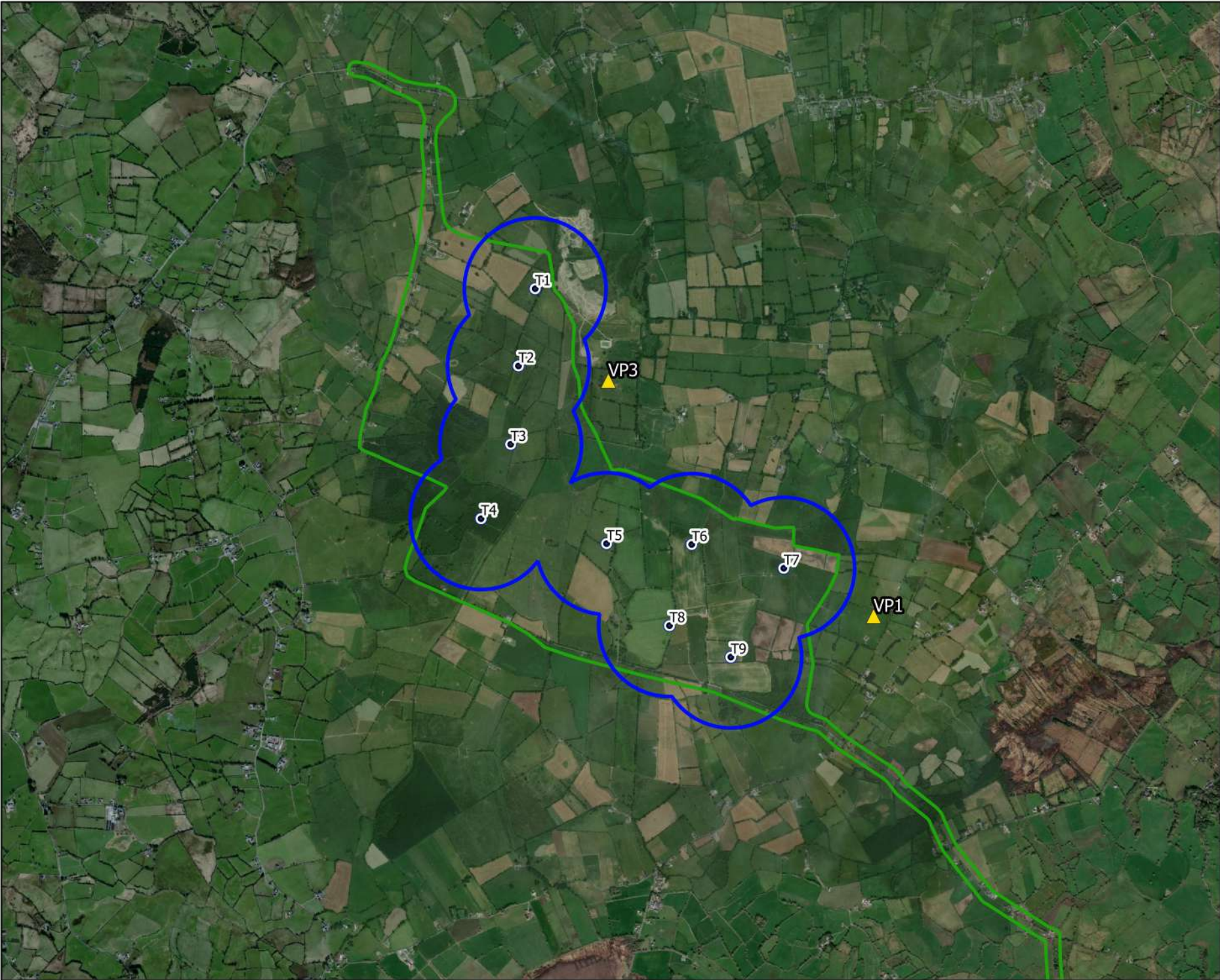




APPENDIX 5

ORNITHOLOGY FIGURES AND DETAILED RESULTS



Map Legend

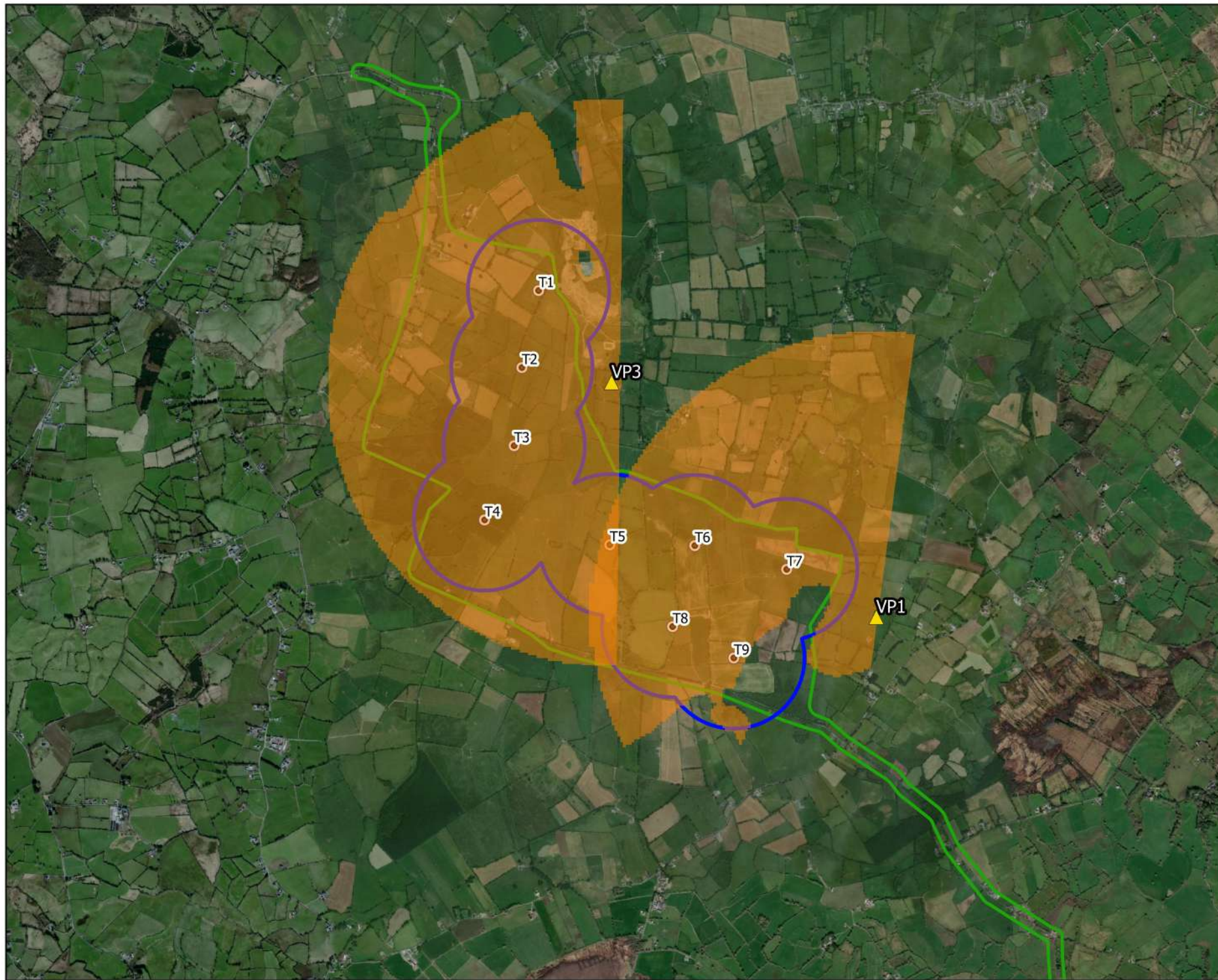
- EIA Site Boundary
- Proposed Turbine Layout
- 500m Radius of Turbines
- VP Locations



Drawing Title	
Vantage Point Locations	
Project Title	
Umma More Renewable Energy Development	
Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-1
Scale	Date
1:35000	31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIA Site Boundary
-  500m Radius of Turbines
-  Turbine Layout
-  VP Locations
-  Viewshed



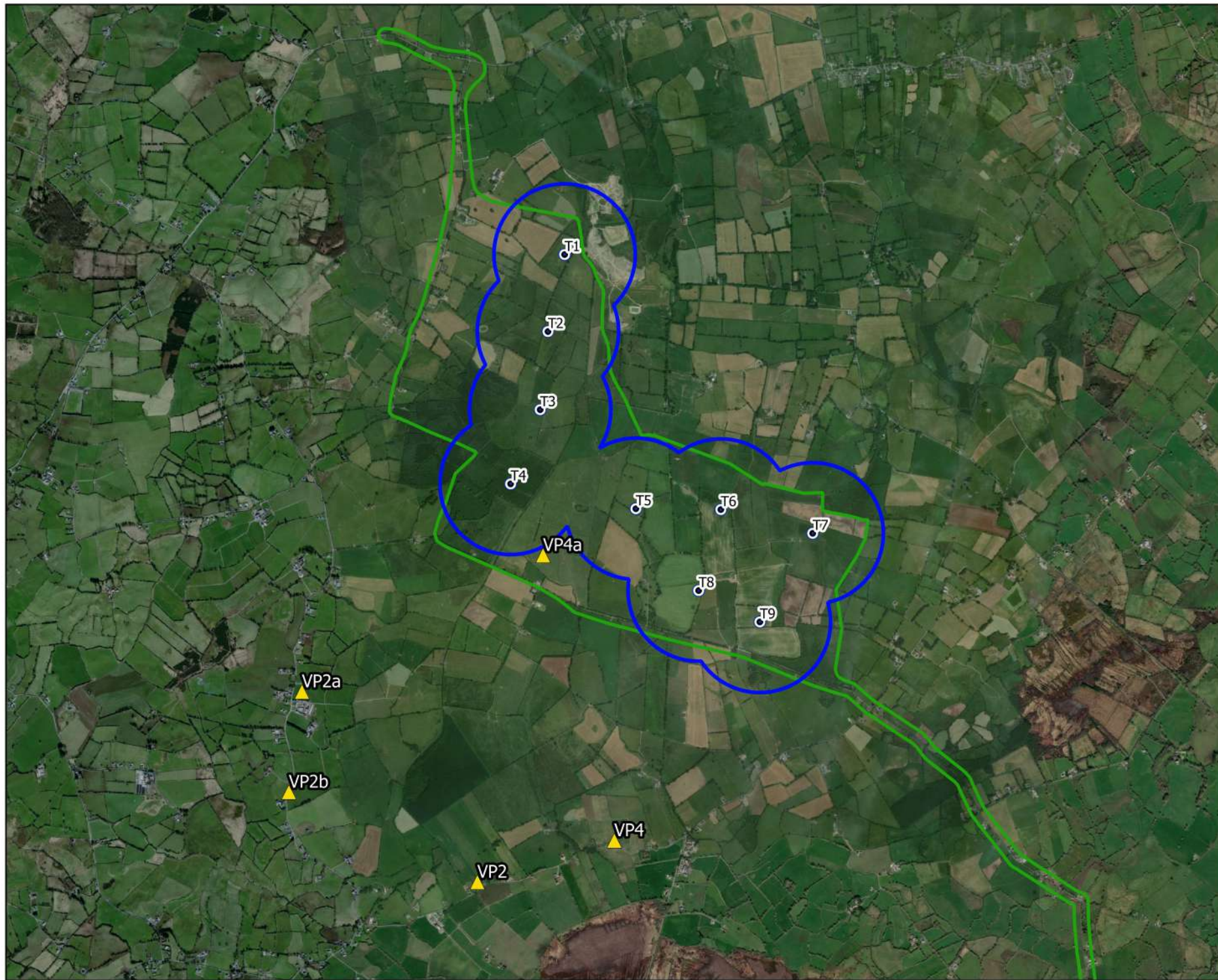
Drawing Title

Viewshed Coverage

Project Title: Umma More Renewable Energy Development	
Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-2
Scale: 1:35000	Date: 31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- 500m Radius of Turbines
- Turbine Layout
- ▲ Supplementary VP Locations



Drawing Title

Supplementary Vantage Points

Project Title

Umma More Renewable Energy Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-3

Scale

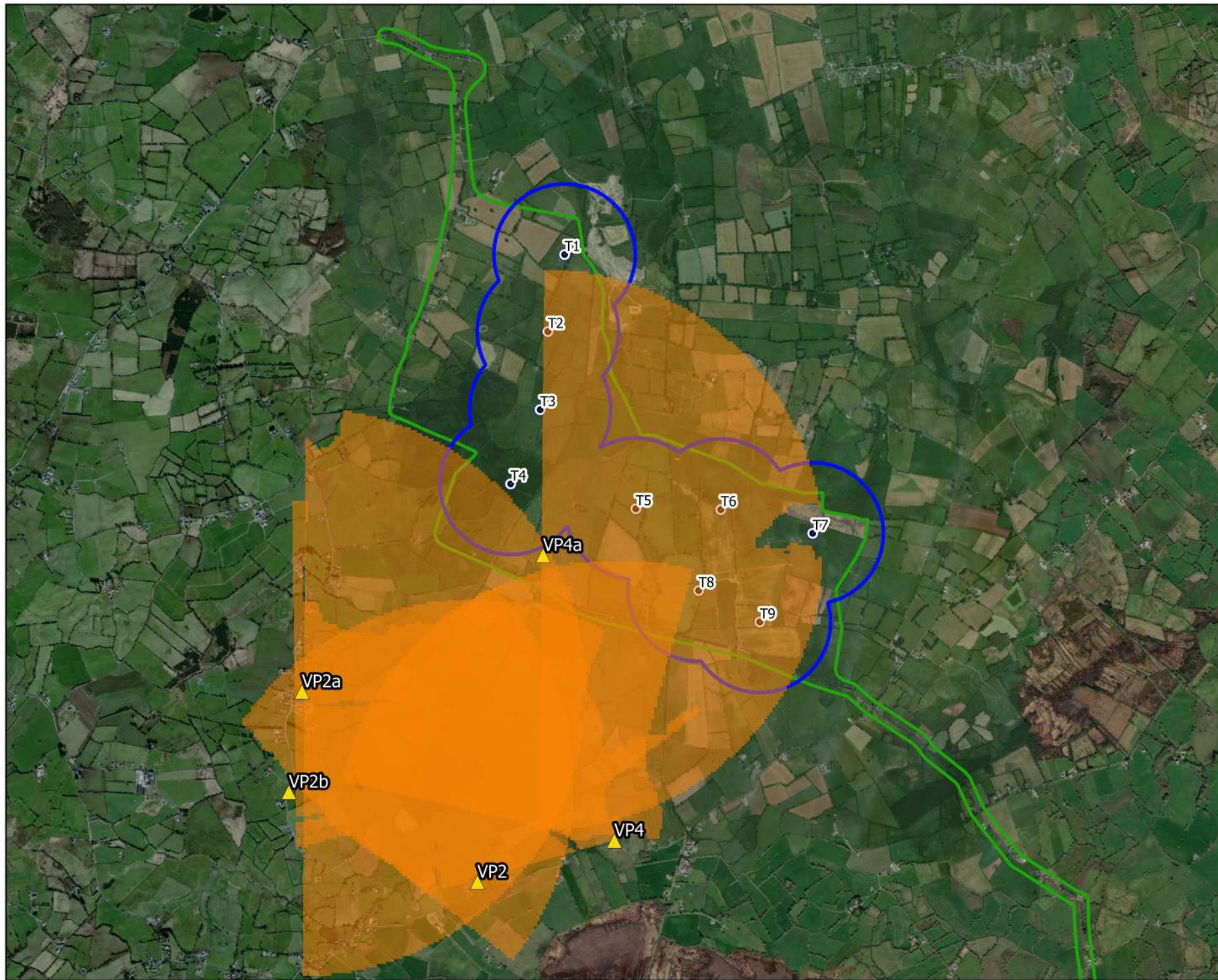
1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 VV84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIAR Site Boundary
- 500m Radius of Turbines
- Turbine Layout
- Supplementary VP Locations
- Viewshed



Drawing Title

Viewshed Coverage (Supplementary VPs)

Project Title
Umma More Renewable Energy
Development

Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4
Scale	Date
1:35000	31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 VV84
+353 (0)91 235611
email: info@mkoireland.ie
Website: www.mkoireland.ie



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  500m Survey Radius



Drawing Title:

Walkover Survey Area

Project Title:

Umma More Renewable Energy Development

Drawn By:	Checked By:
D. Woods	P. Cregg
Project No.:	Drawing No.:
201050	Fig. 7-5
Scale:	Date:
1:35000	31.01.23

 MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  2km Survey Radius
-  RVP Locations



Drawing Title

Raptor Vantage Point Locations

Project Title

Umma More Renewable Energy Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-6

Scale

1:50000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  5km Survey Radius



Drawing Title:
Waterfowl Distribution Survey Area

Project Title:
Umma More Renewable Energy Development

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-7
Scale: 1:75000	Date: 31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkoireland.ie
Website: www.mkoireland.ie



APPENDIX 7-1

SPECIES LIST

Table of Contents

Table 7 - 1 - 1 Target species recorded during surveys.....3

Table 7 - 1 - 2 Species recorded on the wind farm site to a 500m radius 4

Table 7 - 1 - 3 Species recorded further than 500m from the wind farm site..... 6

Table 7-1 - 1 Target species recorded during surveys

Species	Scientific Name	Rationale
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	SCI of Middle Shannon Callows SPA
Buzzard	<i>Buteo buteo</i>	Raptor
Grey Wagtail	<i>Motacilla cinerea</i>	Red List
Golden Plover	<i>Pluvialis apricaria</i>	Annex I & Red List & SCI of Lough Ree SPA and Middle Shannon Callows SPA
Kestrel	<i>Falco tinnunculus</i>	Red List & Raptor
Lapwing	<i>Vanellus vanellus</i>	Red List & SCI of Lough Ree SPA and Middle Shannon Callows SPA
Little Grebe	<i>Tachybaptus ruficollis</i>	SCI of Lough Ree SPA
Mallard	<i>Anas platyrhynchos</i>	SCI of Lough Ree SPA
Meadow Pipit	<i>Anthus pratensis</i>	Red List
Merlin	<i>Falco columbarius</i>	Annex I & Raptor
Peregrine Falcon	<i>Falco peregrinus</i>	Annex I & Raptor
Redwing	<i>Turdus iliacus</i>	Red List
Snipe	<i>Gallinago gallinago</i>	Red List
Sparrowhawk	<i>Accipiter nisus</i>	Raptor
Stock Dove	<i>Columba oenas</i>	Red List
Swift	<i>Apus apus</i>	Red List
Teal	<i>Anas crecca</i>	SCI of Lough Ree SPA
Tufted Duck	<i>Aythya fuligula</i>	SCI of Lough Ree SPA and Lough Ennell SPA
Whinchat	<i>Saxicola rubetra</i>	Red List
Whooper Swan	<i>Cygnus cygnus</i>	Annex I & Red List & SCI of Lough Ree SPA and Middle Shannon Callows SPA

Table 7 - 1 - 2 Species recorded on the wind farm site to a 500m radius

Species	Scientific Name	Target Species
Barn Swallow	<i>Hirundo rustica</i>	No
Blackbird	<i>Turdus merula</i>	No
Blackcap	<i>Sylvia atricapilla</i>	No
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Yes
Blue Tit	<i>Cyanistes caeruleus</i>	No
Bullfinch	<i>Pyrrhula pyrrhula</i>	No
Buzzard	<i>Buteo buteo</i>	Yes
Chaffinch	<i>Fringilla coelebs</i>	No
Chiffchaff	<i>Phylloscopus collybita</i>	No
Coal Tit	<i>Parus ater</i>	No
Collared Dove	<i>Streptopelia decaocto</i>	No
Common Redpoll	<i>Acanthis flammea</i>	No
Dunnock	<i>Prunella modularis</i>	No
Fieldfare	<i>Turdus pilaris</i>	No
Goldcrest	<i>Regulus regulus</i>	No
Golden Plover	<i>Pluvialis apricaria</i>	Yes
Goldfinch	<i>Carduelis carduelis</i>	No
Grasshopper Warbler	<i>Locustella naevia</i>	No
Great Black-backed Gull	<i>Larus marinus</i>	No
Great Tit	<i>Parus major</i>	No
Greenfinch	<i>Chloris chloris</i>	No
Grey Heron	<i>Ardea cinerea</i>	No
Grey Wagtail	<i>Motacilla cinerea</i>	Yes
Herring Gull	<i>Larus argentatus</i>	No
Hooded Crow	<i>Corvus cornix</i>	No
House Martin	<i>Delichon urbicum</i>	No

Species	Scientific Name	Target Species
House Sparrow	<i>Passer domesticus</i>	No
Jack Snipe	<i>Lymnocyptes minimus</i>	No
Jackdaw	<i>Coloeus monedula</i>	No
Jay	<i>Garrulus glandarius</i>	No
Kestrel	<i>Falco tinnunculus</i>	Yes
Lapwing	<i>Vanellus vanellus</i>	Yes
Lesser Black-backed Gull	<i>Larus fuscus</i>	No
Lesser Redpoll	<i>Carduelis flammea cabaret</i>	No
Linnet	<i>Linaria cannabina</i>	No
Long-tailed Tit	<i>Aegithalos caudatus</i>	No
Magpie	<i>Pica pica</i>	No
Mallard	<i>Anas platyrhynchos</i>	Yes
Meadow Pipit	<i>Anthus pratensis</i>	Yes
Merlin	<i>Falco columbarius</i>	Yes
Mistle Thrush	<i>Turdus viscivorus</i>	No
Moorhen	<i>Gallinula chloropus</i>	No
Peregrine Falcon	<i>Falco peregrinus</i>	Yes
Pheasant	<i>Phasianus colchicus</i>	No
Pied Wagtail	<i>Motacilla alba</i>	No
Raven	<i>Corvus corax</i>	No
Redwing	<i>Turdus iliacus</i>	Yes
Reed Bunting	<i>Emberiza schoenichus</i>	No
Reed Warbler	<i>Acrocephalus scirpaceus</i>	No
Ringed Plover	<i>Charadrius hiaticula</i>	No
Robin	<i>Erithacus rubecula</i>	No
Rook	<i>Corvus frugilegus</i>	No
Sand Martin	<i>Riparia riparia</i>	No

Species	Scientific Name	Target Species
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	No
Skylark	<i>Alauda arvensis</i>	No
Snipe	<i>Gallinago gallinago</i>	Yes
Song Thrush	<i>Turdus philomelos</i>	No
Sparrowhawk	<i>Accipiter nisus</i>	Yes
Spotted Flycatcher	<i>Muscicapa striata</i>	No
Starling	<i>Sturnus vulgaris</i>	No
Stock Dove	<i>Columba oenas</i>	No
Stonechat	<i>Saxicola rubicola</i>	No
Swift	<i>Apus apus</i>	Yes
Teal	<i>Anas crecca</i>	Yes
Whinchat	<i>Saxicola rubetra</i>	Yes
Whitethroat	<i>Sylvia communis</i>	No
Whooper Swan	<i>Cygnus cygnus</i>	Yes
Willow Warbler	<i>Phylloscopus trochilus</i>	No
Woodpigeon	<i>Columba palumbus</i>	No
Wren	<i>Troglodytes troglodytes</i>	No

Table 7 - 1 - 3 Species recorded further than 500m from the wind farm site

Species	Scientific Name	Target Species
Cormorant	<i>Phalacrocorax carbo</i>	No
Great-crested Grebe	<i>Podiceps cristatus</i>	No
Mute Swan	<i>Cygnus olor</i>	No
Raven	<i>Corvus corax</i>	No
Tufted Duck	<i>Aythya fuligula</i>	Yes
Water Rail	<i>Rallus aquaticus</i>	No



APPENDIX 7-2

SURVEY EFFORT



Table of Contents

<i>Table 7 - 2 - 1 Vantage Point survey effort.....</i>	<i>2</i>
<i>Table 7 - 2 - 2 Winter Walkover survey effort.....</i>	<i>26</i>
<i>Table 7 - 2 - 3 Breeding Walkover survey effort.....</i>	<i>29</i>
<i>Table 7 - 2 - 4 Waterbird Distribution survey effort.....</i>	<i>31</i>
<i>Table 7 - 2 - 5 Breeding Raptor survey effort.</i>	<i>37</i>

Table 7 - 2 - 1 Vantage Point survey effort

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
24/04/2019	Vantage Point Survey	VP1	1:00 starting at 15:20	Visibility: moderate; Wind speed and direction: light breeze SE; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none		JC
24/04/2019	Vantage Point Survey	VP1	1:00 starting at 16:20	Visibility: moderate; Wind speed and direction: light breeze SE; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none		JC
24/04/2019	Vantage Point Survey	VP1	1:00 starting at 17:20	Visibility: moderate; Wind speed and direction: light air SE; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none		JC
24/04/2019	Vantage Point Survey	VP1	1:00 starting at 18:50	Visibility: moderate; Wind speed and direction: light air SE; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none		JC
24/04/2019	Vantage Point Survey	VP1	1:00 starting at 19:50	Visibility: moderate; Wind speed and direction: light air SE; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
24/04/2019	Vantage Point Survey	VP1	1:00 starting at 20:50	Visibility: moderate; Wind speed and direction: light air SE; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
25/04/2019	Vantage Point Survey	VP4a	1:00 starting at 15:20	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
25/04/2019	Vantage Point Survey	VP4a	1:00 starting at 16:20	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
25/04/2019	Vantage Point Survey	VP4a	1:00 starting at 17:20	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none		JC
25/04/2019	Vantage Point Survey	VP4a	1:00 starting at 18:50	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
25/04/2019	Vantage Point Survey	VP4a	1:00 starting at 19:50	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
25/04/2019	Vantage Point Survey	VP4a	1:00 starting at 20:50	Visibility: poor; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
26/04/2019	Vantage Point Survey	VP2a	1:00 starting at 15:20	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
26/04/2019	Vantage Point Survey	VP2a	1:00 starting at 16:20	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
26/04/2019	Vantage Point Survey	VP2a	1:00 starting at 17:20	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
26/04/2019	Vantage Point Survey	VP2a	1:00 starting at 18:50	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
26/04/2019	Vantage Point Survey	VP2a	1:00 starting at 19:50	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
26/04/2019	Vantage Point Survey	VP2a	1:00 starting at 20:50	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
29/04/2019	Vantage Point Survey	VP3	1:00 starting at 15:25	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
29/04/2019	Vantage Point Survey	VP3	1:00 starting at 16:25	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
29/04/2019	Vantage Point Survey	VP3	1:00 starting at 17:25	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
29/04/2019	Vantage Point Survey	VP3	1:00 starting at 18:55	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
29/04/2019	Vantage Point Survey	VP3	1:00 starting at 19:55	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
29/04/2019	Vantage Point Survey	VP3	1:00 starting at 20:55	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
21/05/2019	Vantage Point Survey	VP3	1:00 starting at 04:22	Visibility: poor; Wind speed and direction: light breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	ground fog below in valley	JC
21/05/2019	Vantage Point Survey	VP3	1:00 starting at 05:22	Visibility: good; Wind speed and direction: light breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	fog starting to clear at 05:52	JC
21/05/2019	Vantage Point Survey	VP3	1:00 starting at 06:22	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
21/05/2019	Vantage Point Survey	VP3	1:00 starting at 07:52	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
21/05/2019	Vantage Point Survey	VP3	1:00 starting at 08:52	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
21/05/2019	Vantage Point Survey	VP3	1:00 starting at 09:52	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
22/05/2019	Vantage Point Survey	VP1	1:00 starting at 04:20	Visibility: poor; Wind speed and direction: light air -; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
22/05/2019	Vantage Point Survey	VP1	1:00 starting at 05:20	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
22/05/2019	Vantage Point Survey	VP1	1:00 starting at 06:20	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
22/05/2019	Vantage Point Survey	VP1	1:00 starting at 07:50	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
22/05/2019	Vantage Point Survey	VP1	1:00 starting at 08:50	Visibility: good; Wind speed and direction: light air SSW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
22/05/2019	Vantage Point Survey	VP1	1:00 starting at 09:50	Visibility: good; Wind speed and direction: light breeze SSW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
29/05/2019	Vantage Point Survey	VP2	1:00 starting at 04:08	Visibility: poor; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none	slight drizzle	JC
29/05/2019	Vantage Point Survey	VP2	1:00 starting at 05:08	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none	slight drizzle	JC
29/05/2019	Vantage Point Survey	VP2	1:00 starting at 06:08	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none	slight drizzle	JC
29/05/2019	Vantage Point Survey	VP2	1:00 starting at 07:38	Visibility: poor; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
29/05/2019	Vantage Point Survey	VP2	1:00 starting at 08:38	Visibility: moderate; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
29/05/2019	Vantage Point Survey	VP2	1:00 starting at 09:38	Visibility: poor; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
30/05/2019	Vantage Point Survey	VP4	1:00 starting at 04:08	Visibility: poor; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
30/05/2019	Vantage Point Survey	VP4	1:00 starting at 05:08	Visibility: poor; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
30/05/2019	Vantage Point Survey	VP4	1:00 starting at 06:08	Visibility: poor; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
30/05/2019	Vantage Point Survey	VP4	1:00 starting at 07:38	Visibility: moderate; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
30/05/2019	Vantage Point Survey	VP4	1:00 starting at 08:38	Visibility: moderate; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
30/05/2019	Vantage Point Survey	VP4	1:00 starting at 09:38	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
24/06/2019	Vantage Point Survey	VP3	1:00 starting at 12:05	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
24/06/2019	Vantage Point Survey	VP3	1:00 starting at 13:05	Visibility: good; Wind speed and direction: light breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
24/06/2019	Vantage Point Survey	VP3	1:00 starting at 14:05	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
24/06/2019	Vantage Point Survey	VP3	1:00 starting at 15:35	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
24/06/2019	Vantage Point Survey	VP3	1:00 starting at 16:35	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
24/06/2019	Vantage Point Survey	VP3	1:00 starting at 17:35	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		JC
25/06/2019	Vantage Point Survey	VP4	1:00 starting at 08:00	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
25/06/2019	Vantage Point Survey	VP4	1:00 starting at 09:00	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
25/06/2019	Vantage Point Survey	VP4	1:00 starting at 10:00	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
25/06/2019	Vantage Point Survey	VP4	1:00 starting at 11:30	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
25/06/2019	Vantage Point Survey	VP4	1:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
25/06/2019	Vantage Point Survey	VP4	1:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
26/06/2019	Vantage Point Survey	VP2	1:00 starting at 09:00	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
26/06/2019	Vantage Point Survey	VP2	1:00 starting at 10:00	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
26/06/2019	Vantage Point Survey	VP2	1:00 starting at 11:00	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
26/06/2019	Vantage Point Survey	VP2	1:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
26/06/2019	Vantage Point Survey	VP2	1:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
26/06/2019	Vantage Point Survey	VP2	1:00 starting at 14:30	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
27/06/2019	Vantage Point Survey	VP1	1:00 starting at 09:00	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
27/06/2019	Vantage Point Survey	VP1	1:00 starting at 10:00	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
27/06/2019	Vantage Point Survey	VP1	1:00 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
27/06/2019	Vantage Point Survey	VP1	1:00 starting at 12:30	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
27/06/2019	Vantage Point Survey	VP1	1:00 starting at 13:30	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
27/06/2019	Vantage Point Survey	VP1	1:00 starting at 14:30	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
16/07/2019	Vantage Point Survey	VP4	1:00 starting at 10:04	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PW
16/07/2019	Vantage Point Survey	VP4	2:00 starting at 11:04	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PW
16/07/2019	Vantage Point Survey	VP4	1:00 starting at 13:34	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PW
16/07/2019	Vantage Point Survey	VP4	1:00 starting at 14:34	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PW
16/07/2019	Vantage Point Survey	VP4	1:00 starting at 15:34	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PW
16/07/2019	Vantage Point Survey	VP1	1:00 starting at 18:29	Visibility: good; Wind speed and direction: fresh breeze WNW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PW
16/07/2019	Vantage Point Survey	VP1	1:00 starting at 19:29	Visibility: good; Wind speed and direction: moderate breeze WNW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PW
16/07/2019	Vantage Point Survey	VP1	1:00 starting at 20:29	Visibility: good; Wind speed and direction: gentle breeze WNW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PW

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
17/07/2019	Vantage Point Survey	VP3	1:00 starting at 11:43	Visibility: poor; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		PW
17/07/2019	Vantage Point Survey	VP3	1:00 starting at 12:43	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PW
17/07/2019	Vantage Point Survey	VP3	1:00 starting at 13:43	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		PW
17/07/2019	Vantage Point Survey	VP3	1:00 starting at 15:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		PW
17/07/2019	Vantage Point Survey	VP3	1:00 starting at 16:30	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		PW
17/07/2019	Vantage Point Survey	VP3	1:00 starting at 17:30	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PW
18/07/2019	Vantage Point Survey	VP1	1:00 starting at 09:53	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		PW
18/07/2019	Vantage Point Survey	VP1	1:00 starting at 10:53	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		PW
18/07/2019	Vantage Point Survey	VP1	1:00 starting at 11:53	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PW
22/07/2019	Vantage Point Survey	VP2b	1:00 starting at 14:00	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PW

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
22/07/2019	Vantage Point Survey	VP2b	2:00 starting at 15:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PW
22/07/2019	Vantage Point Survey	VP2b	1:00 starting at 17:42	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PW
22/07/2019	Vantage Point Survey	VP2b	2:00 starting at 18:42	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PW
27/08/2019	Vantage Point Survey	VP4	1:00 starting at 15:03	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
27/08/2019	Vantage Point Survey	VP4	1:00 starting at 16:03	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
27/08/2019	Vantage Point Survey	VP4	1:00 starting at 17:03	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
27/08/2019	Vantage Point Survey	VP4	1:00 starting at 18:33	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
27/08/2019	Vantage Point Survey	VP4	1:00 starting at 19:33	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
27/08/2019	Vantage Point Survey	VP4	1:00 starting at 20:33	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
28/08/2019	Vantage Point Survey	VP2	1:00 starting at 15:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
28/08/2019	Vantage Point Survey	VP2	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		JC
28/08/2019	Vantage Point Survey	VP2	1:00 starting at 17:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
28/08/2019	Vantage Point Survey	VP2	1:00 starting at 18:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
28/08/2019	Vantage Point Survey	VP2	1:00 starting at 19:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
28/08/2019	Vantage Point Survey	VP2	1:00 starting at 20:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
29/08/2019	Vantage Point Survey	VP1	1:00 starting at 15:00	Visibility: moderate; Wind speed and direction: strong breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		JC
29/08/2019	Vantage Point Survey	VP1	1:00 starting at 16:00	Visibility: moderate; Wind speed and direction: near gale W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		JC
29/08/2019	Vantage Point Survey	VP1	1:00 starting at 17:00	Visibility: moderate; Wind speed and direction: near gale W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		JC
29/08/2019	Vantage Point Survey	VP1	1:00 starting at 18:30	Visibility: moderate; Wind speed and direction: near gale SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		JC
29/08/2019	Vantage Point Survey	VP1	1:00 starting at 19:30	Visibility: moderate; Wind speed and direction: strong breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
29/08/2019	Vantage Point Survey	VP1	1:00 starting at 20:30	Visibility: moderate; Wind speed and direction: strong breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		JC
31/08/2019	Vantage Point Survey	VP3	1:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
31/08/2019	Vantage Point Survey	VP3	1:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
31/08/2019	Vantage Point Survey	VP3	1:00 starting at 17:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
31/08/2019	Vantage Point Survey	VP3	1:00 starting at 18:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
31/08/2019	Vantage Point Survey	VP3	1:00 starting at 19:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
31/08/2019	Vantage Point Survey	VP3	1:00 starting at 20:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
11/09/2019	Vantage Point Survey	VP1	3:00 starting at 05:55	Visibility: good; Wind speed and direction: strong breeze SW; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		JK
11/09/2019	Vantage Point Survey	VP1	3:00 starting at 09:25	Visibility: good; Wind speed and direction: strong breeze SW; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		JK
18/09/2019	Vantage Point Survey	VP3	3:00 starting at 06:05	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		JK

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
18/09/2019	Vantage Point Survey	VP3	3:00 starting at 09:35	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		JK
16/10/2019	Vantage Point Survey	VP1	1:00 starting at 13:02	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
16/10/2019	Vantage Point Survey	VP1	1:00 starting at 14:02	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		PM
16/10/2019	Vantage Point Survey	VP1	1:00 starting at 15:02	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
16/10/2019	Vantage Point Survey	VP1	3:00 starting at 16:32	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
24/10/2019	Vantage Point Survey	VP3	1:00 starting at 12:45	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
24/10/2019	Vantage Point Survey	VP3	2:00 starting at 13:45	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		PM
24/10/2019	Vantage Point Survey	VP3	3:00 starting at 16:15	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
12/11/2019	Vantage Point Survey	VP3	3:00 starting at 06:49	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PM
12/11/2019	Vantage Point Survey	VP3	3:00 starting at 10:19	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PM

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
13/11/2019	Vantage Point Survey	VP1	3:00 starting at 06:51	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: light showers; Frost: none; Snow: none		PM
13/11/2019	Vantage Point Survey	VP1	1:00 starting at 10:21	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: light showers; Frost: none; Snow: none		PM
13/11/2019	Vantage Point Survey	VP1	1:00 starting at 11:21	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: heavy showers; Frost: none; Snow: none		PM
13/11/2019	Vantage Point Survey	VP1	1:00 starting at 12:21	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: light showers; Frost: none; Snow: none		PM
10/12/2019	Vantage Point Survey	VP1	3:00 starting at 10:42	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: persistent; Frost: none; Snow: none		PM
10/12/2019	Vantage Point Survey	VP1	2:00 starting at 14:12	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
10/12/2019	Vantage Point Survey	VP1	1:00 starting at 16:12	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PM
11/12/2019	Vantage Point Survey	VP3	3:00 starting at 10:42	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PM
11/12/2019	Vantage Point Survey	VP3	3:00 starting at 14:12	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PM
16/01/2020	Vantage Point Survey	VP1	2:00 starting at 07:37	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
16/01/2020	Vantage Point Survey	VP1	1:00 starting at 09:37	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		PM
16/01/2020	Vantage Point Survey	VP1	3:00 starting at 11:07	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		PM
17/01/2020	Vantage Point Survey	VP3	3:00 starting at 07:36	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: light; Snow: none		PM
17/01/2020	Vantage Point Survey	VP3	1:00 starting at 11:06	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PM
17/01/2020	Vantage Point Survey	VP3	2:00 starting at 12:06	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
13/02/2020	Vantage Point Survey	VP3	3:00 starting at 12:06	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
13/02/2020	Vantage Point Survey	VP3	3:00 starting at 15:36	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
17/02/2020	Vantage Point Survey	VP1	3:00 starting at 12:15	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PM
17/02/2020	Vantage Point Survey	VP1	3:00 starting at 15:45	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PM
23/03/2020	Vantage Point Survey	VP1	6:00 starting at 06:30	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		ED

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
27/03/2020	Vantage Point Survey	VP3	6:00 starting at 06:35	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		ED
16/04/2020	Vantage Point Survey	VP1	1:00 starting at 15:04	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		TR
16/04/2020	Vantage Point Survey	VP1	1:00 starting at 16:04	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		TR
16/04/2020	Vantage Point Survey	VP1	1:00 starting at 17:04	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		TR
16/04/2020	Vantage Point Survey	VP1	1:00 starting at 18:34	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		TR
16/04/2020	Vantage Point Survey	VP1	1:00 starting at 19:34	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		TR
16/04/2020	Vantage Point Survey	VP1	1:00 starting at 20:34	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		TR
17/04/2020	Vantage Point Survey	VP3	1:00 starting at 15:05	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		TR
17/04/2020	Vantage Point Survey	VP3	1:00 starting at 16:05	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		TR
17/04/2020	Vantage Point Survey	VP3	1:00 starting at 17:05	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		TR

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
17/04/2020	Vantage Point Survey	VP3	1:00 starting at 18:35	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		TR
17/04/2020	Vantage Point Survey	VP3	1:00 starting at 19:35	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		TR
17/04/2020	Vantage Point Survey	VP3	1:00 starting at 20:35	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		TR
09/05/2020	Vantage Point Survey	VP1	3:00 starting at 05:00	Visibility: poor; Wind speed and direction: light air WSW; Cloud cover and height: 33-66% <150m; Rain: none; Frost: none; Snow: none	Mist in the valley . Visibility improved after 6:45.	NG
09/05/2020	Vantage Point Survey	VP1	3:00 starting at 08:30	Visibility: poor; Wind speed and direction: light air WSW; Cloud cover and height: 33-66% <150m; Rain: none; Frost: none; Snow: none		NG
14/05/2020	Vantage Point Survey	VP3	3:00 starting at 05:00	Visibility: good; Wind speed and direction: light air NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: light; Snow: none	minus 1 Celsius until 07:30.	NG
14/05/2020	Vantage Point Survey	VP3	3:00 starting at 08:30	Visibility: good; Wind speed and direction: light air NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: light; Snow: none		NG
24/06/2020	Vantage Point Survey	VP1	3:00 starting at 05:30	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none	Field contained 20+ bullocks	PC
24/06/2020	Vantage Point Survey	VP1	3:00 starting at 09:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PC
29/06/2020	Vantage Point Survey	VP3	3:00 starting at 05:40	Visibility: good; Wind speed and direction: near gale W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none	Conditions were pretty atrocious at times, with heavy showers blowing heavy rain into the VP from the west.	PC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
29/06/2020	Vantage Point Survey	VP3	3:00 starting at 09:10	Visibility: good; Wind speed and direction: gale N; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none	Wind was stronger but rain wasn't quite so heavy	PC
08/07/2020	Vantage Point Survey	VP3	3:00 starting at 05:10	Visibility: moderate; Wind speed and direction: gentle breeze N; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none	Showers on arrival, gone by 5:30am.	PC
08/07/2020	Vantage Point Survey	VP3	3:00 starting at 08:40	Visibility: good; Wind speed and direction: fresh breeze E; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PC
22/07/2020	Vantage Point Survey	VP1	3:00 starting at 05:15	Visibility: poor; Wind speed and direction: strong breeze E; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none	Poor visibility over viewshed, hills opposite VP shrouded in mist for most of the morning.	PC
22/07/2020	Vantage Point Survey	VP1	3:00 starting at 08:45	Visibility: poor; Wind speed and direction: near gale SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		PC
25/08/2020	Vantage Point Survey	VP1	3:00 starting at 15:00	Visibility: moderate; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% >500m; Rain: persistent; Frost: none; Snow: none		PM
25/08/2020	Vantage Point Survey	VP1	2:00 starting at 18:30	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
25/08/2020	Vantage Point Survey	VP1	1:00 starting at 20:30	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		PM
26/08/2020	Vantage Point Survey	VP3	3:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
26/08/2020	Vantage Point Survey	VP3	3:00 starting at 18:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
15/09/2020	Vantage Point Survey	VP3	3:00 starting at 06:30	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Ground mist over much of valley on arrival	PC
15/09/2020	Vantage Point Survey	VP3	3:00 starting at 10:00	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PC
18/09/2020	Vantage Point Survey	VP1	3:00 starting at 06:10		Ground mist over much of valley on arrival. Visibility deteriorated during these 3 hours.	PC
18/09/2020	Vantage Point Survey	VP1	3:00 starting at 09:40	Visibility: good; Wind speed and direction: strong breeze NE / E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Mist had cleared by 9:00am	PC
08/10/2020	Vantage Point Survey	VP3	3:00 starting at 11:30	Visibility: good; Wind speed and direction: near gale NW/W; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none	Weather cleared during early afternoon from light drizzle and mist	PC
08/10/2020	Vantage Point Survey	VP3	3:00 starting at 14:30	Visibility: good; Wind speed and direction: near gale NW/W; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		PC
12/10/2020	Vantage Point Survey	VP1	3:00 starting at 11:15	Visibility: poor; Wind speed and direction: gale NW/W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none	Heavy rain closed in on arrival.	PC
12/10/2020	Vantage Point Survey	VP1	3:00 starting at 14:15	Visibility: moderate; Wind speed and direction: gale NW/W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none	Very changeable conditions, heavy rain followed by brilliant sunshine.	PC
04/11/2020	Vantage Point Survey	VP1	2:00 starting at 07:10			PC
04/11/2020	Vantage Point Survey	VP1	1:00 starting at 09:10	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		PC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
04/11/2020	Vantage Point Survey	VP1	1:00 starting at 10:40			PC
04/11/2020	Vantage Point Survey	VP1	2:00 starting at 11:40	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		PC
05/11/2020	Vantage Point Survey	VP3	2:00 starting at 07:00	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		PC
05/11/2020	Vantage Point Survey	VP3	1:00 starting at 09:00	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PC
05/11/2020	Vantage Point Survey	VP3	2:00 starting at 10:30	Visibility: moderate; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PC
05/11/2020	Vantage Point Survey	VP3	1:00 starting at 12:30	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PC
02/12/2020	Vantage Point Survey	VP1	1:00 starting at 09:10	Visibility: good; Wind speed and direction: near gale SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PC
02/12/2020	Vantage Point Survey	VP1	1:00 starting at 10:10	Visibility: moderate; Wind speed and direction: near gale SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		PC
02/12/2020	Vantage Point Survey	VP1	1:00 starting at 11:10	Visibility: good; Wind speed and direction: near gale W; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		PC
02/12/2020	Vantage Point Survey	VP1	2:00 starting at 12:40	Visibility: moderate; Wind speed and direction: strong breeze W; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		PC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
02/12/2020	Vantage Point Survey	VP1	1:00 starting at 14:40	Visibility: moderate; Wind speed and direction: strong breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		PC
15/12/2020	Vantage Point Survey	VP3	2:00 starting at 09:10	Visibility: good; Wind speed and direction: strong breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PC
15/12/2020	Vantage Point Survey	VP3	1:00 starting at 11:10	Visibility: good; Wind speed and direction: near gale SE; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		PC
15/12/2020	Vantage Point Survey	VP3	2:00 starting at 12:40	Visibility: good; Wind speed and direction: gale SE; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		PC
15/12/2020	Vantage Point Survey	VP3	1:00 starting at 14:40	Visibility: good; Wind speed and direction: gale SE; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		PC
07/01/2021	Vantage Point Survey	VP3	1:00 starting at 07:45	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: heavy; Snow: on ground		PM
07/01/2021	Vantage Point Survey	VP3	2:00 starting at 08:45	Visibility: poor; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: heavy; Snow: on ground		PM
07/01/2021	Vantage Point Survey	VP3	3:00 starting at 11:15	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: heavy; Snow: on ground		PM
21/01/2021	Vantage Point Survey	VP1	3:00 starting at 07:30	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
21/01/2021	Vantage Point Survey	VP1	3:00 starting at 11:00	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PM

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
15/02/2021	Vantage Point Survey	VP1	1:00 starting at 08:30	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PDC
15/02/2021	Vantage Point Survey	VP1	1:00 starting at 09:30	Visibility: good; Wind speed and direction: moderate breeze N; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PDC
15/02/2021	Vantage Point Survey	VP1	1:00 starting at 10:30	Visibility: moderate; Wind speed and direction: strong breeze N; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		PDC
15/02/2021	Vantage Point Survey	VP1	1:00 starting at 12:00	Visibility: moderate; Wind speed and direction: strong breeze N; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		PDC
15/02/2021	Vantage Point Survey	VP1	1:00 starting at 13:00	Visibility: good; Wind speed and direction: fresh breeze N; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PDC
15/02/2021	Vantage Point Survey	VP1	1:00 starting at 14:00	Visibility: good; Wind speed and direction: fresh breeze N; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		PDC
16/02/2021	Vantage Point Survey	VP3	1:00 starting at 08:30	Visibility: moderate; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		PDC
16/02/2021	Vantage Point Survey	VP3	1:00 starting at 09:30	Visibility: moderate; Wind speed and direction: near gale SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PDC
16/02/2021	Vantage Point Survey	VP3	1:00 starting at 10:30	Visibility: good; Wind speed and direction: near gale S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PDC
16/02/2021	Vantage Point Survey	VP3	1:00 starting at 12:00	Visibility: good; Wind speed and direction: strong breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PDC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
16/02/2021	Vantage Point Survey	VP3	1:00 starting at 13:00	Visibility: moderate; Wind speed and direction: near gale S; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		PDC
16/02/2021	Vantage Point Survey	VP3	1:00 starting at 14:00	Visibility: good; Wind speed and direction: strong breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PDC
11/03/2021	Vantage Point Survey	VP1	1:00 starting at 07:10	Visibility: moderate; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PDC
11/03/2021	Vantage Point Survey	VP1	2:00 starting at 08:10	Visibility: good; Wind speed and direction: strong breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		PDC
11/03/2021	Vantage Point Survey	VP1	1:00 starting at 10:40	Visibility: moderate; Wind speed and direction: near gale SW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none	Very heavy showers swept across the viewshed, making visibility very poor.	PDC
11/03/2021	Vantage Point Survey	VP1	1:00 starting at 11:40	Visibility: poor; Wind speed and direction: near gale SW; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		PDC
11/03/2021	Vantage Point Survey	VP1	1:00 starting at 12:40	Visibility: moderate; Wind speed and direction: near gale SW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none	Hail showers.	PDC
23/03/2021	Vantage Point Survey	VP3	1:00 starting at 07:00	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PDC
23/03/2021	Vantage Point Survey	VP3	2:00 starting at 08:00	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PDC
23/03/2021	Vantage Point Survey	VP3	2:00 starting at 10:30	Visibility: good; Wind speed and direction: near gale SE; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PDC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
23/03/2021	Vantage Point Survey	VP3	1:00 starting at 12:30	Visibility: moderate; Wind speed and direction: near gale SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		PDC

Table 7 - 2 - 2 Winter Walkover survey effort.

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
25/10/2019	Winter Walkover Survey	500m Radius	6:00 starting at 09:50	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		PM
16/12/2019	Winter Walkover Survey	500m Radius	6:00 starting at 09:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: on ground		PM
22/01/2020	Winter Walkover Survey	500m Radius	6:00 starting at 09:00	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PM
01/03/2020	Winter Walkover Survey	500m Radius	6:00 starting at 08:50	Visibility: good; Wind speed and direction: gale SW; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		ED
27/10/2020	Winter Walkover Survey	500m Radius	1:00 starting at 08:30	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none	Changeable conditions all day.	PC
27/10/2020	Winter Walkover Survey	500m Radius	1:00 starting at 09:30	Visibility: moderate; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PC
27/10/2020	Winter Walkover Survey	500m Radius	1:00 starting at 10:30	Visibility: good; Wind speed and direction: near gale NW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		PC
27/10/2020	Winter Walkover Survey	500m Radius	1:00 starting at 11:30	Visibility: good; Wind speed and direction: strong breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PC
27/10/2020	Winter Walkover Survey	500m Radius	1:00 starting at 12:30	Visibility: moderate; Wind speed and direction: near gale NW; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		PC
08/01/2021	Winter Walkover Survey	500m Radius	1:00 starting at 10:05	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: light; Snow: on ground	Frost in the morning, also some snow and ice in the fields	KOC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
08/01/2021	Winter Walkover Survey	500m Radius	1:00 starting at 11:05	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: light; Snow: on ground		KOC
08/01/2021	Winter Walkover Survey	500m Radius	1:00 starting at 12:05	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: light; Snow: on ground		KOC
08/01/2021	Winter Walkover Survey	500m Radius	1:00 starting at 13:35	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: on ground		KOC
08/01/2021	Winter Walkover Survey	500m Radius	1:00 starting at 14:35	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: on ground		KOC
08/01/2021	Winter Walkover Survey	500m Radius	1:00 starting at 15:35	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: on ground		KOC
25/02/2021	Winter Walkover Survey	500m Radius	1:00 starting at 10:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		PDC
25/02/2021	Winter Walkover Survey	500m Radius	1:00 starting at 11:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		PDC
25/02/2021	Winter Walkover Survey	500m Radius	2:00 starting at 12:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		PDC
25/02/2021	Winter Walkover Survey	500m Radius	0:45 starting at 14:30	Visibility: good; Wind speed and direction: near gale S; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		PDC
24/03/2021	Winter Walkover Survey	500m Radius	1:00 starting at 08:30	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		PDC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
24/03/2021	Winter Walkover Survey	500m Radius	1:00 starting at 09:30	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		PDC
24/03/2021	Winter Walkover Survey	500m Radius	1:00 starting at 10:30	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PDC
24/03/2021	Winter Walkover Survey	500m Radius	1:00 starting at 11:30	Visibility: moderate; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		PDC
24/03/2021	Winter Walkover Survey	500m Radius	1:30 starting at 12:30	Visibility: moderate; Wind speed and direction: strong breeze NW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none	Heavy showers turned persistant	PDC

Table 7 - 2 - 3 Breeding Walkover survey effort.

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
19/04/2019	Breeding Walkover Survey	North	3:01 starting at 09:00	Visibility: good; AF15 speed and direction: light air E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Still air - no wind (direction)	JC
19/04/2019	Breeding Walkover Survey	North	2:50 starting at 12:10	Visibility: good; Wind speed and direction: light breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
25/04/2019	Breeding Walkover Survey	South	3:00 starting at 12:00	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
26/04/2019	Breeding Walkover Survey	South	3:00 starting at 12:10	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
29/05/2019	Breeding Walkover Survey	South	1:15 starting at 11:00	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		JC
29/05/2019	Breeding Walkover Survey	South	1:30 starting at 12:30	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		JC
30/05/2019	Breeding Walkover Survey	North	2:26 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
30/05/2019	Breeding Walkover Survey	North	2:15 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
28/06/2019	Breeding Walkover Survey	North	2:45 starting at 10:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
28/06/2019	Breeding Walkover Survey	North	2:30 starting at 13:15	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
28/06/2019	Breeding Walkover Survey	South	1:45 starting at 16:10	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
17/05/2020	Breeding Walkover Survey	South	8:00 starting at 08:30	Visibility: poor; Wind speed and direction: light breeze SW; Cloud cover and height: 33-66% <150m; Rain: none; Frost: none; Snow: none	began to rain in 2nd hour, then improved. Wind increased	NG
24/05/2020	Breeding Walkover Survey	North	6:30 starting at 09:00	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none	weather improved, became quite warm and sunny	NG
06/06/2020	Breeding Walkover Survey	North + South	6:40 starting at 06:30	Visibility: limited; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none	Poor conditions to start, gradually improved as the morning went on	NG
31/07/2020	Breeding Walkover Survey	North + South	6:00 starting at 08:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		PM

Table 7 - 2 - 4 Waterbird Distribution survey effort

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
16/09/2019	Waterbird Distribution Survey	5km	6:30 starting at 09:45	Visibility: good; Wind speed and direction: strong breeze N; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		JK
23/09/2019	Waterbird Distribution Survey	5km	6:30 starting at 09:20	Visibility: good; Wind speed and direction: strong breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		JK
07/10/2019	Waterbird Distribution Survey	5km	3:00 starting at 09:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
17/10/2019	Waterbird Distribution Survey	5km	3:00 starting at 08:00	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
08/11/2019	Waterbird Distribution Survey	5km	3:00 starting at 09:30	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: light; Snow: none		PM
22/11/2019	Waterbird Distribution Survey	5km	3:00 starting at 10:00	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PM
06/12/2019	Waterbird Distribution Survey	5km	3:00 starting at 10:30	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: on ground		PM
19/12/2019	Waterbird Distribution Survey	5km	3:00 starting at 14:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		PM
02/01/2020	Waterbird Distribution Survey	5km	3:00 starting at 08:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		PM
29/01/2020	Waterbird Distribution Survey	5km	3:00 starting at 09:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
10/02/2020	Waterbird Distribution Survey	5km	3:00 starting at 08:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
25/02/2020	Waterbird Distribution Survey	5km	3:00 starting at 10:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
10/03/2020	Waterbird Distribution Survey	5km	6:00 starting at 09:40	Visibility: good; Wind speed and direction: near gale W; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none		ED
24/03/2020	Waterbird Distribution Survey	5km	6:00 starting at 09:20	Visibility: good; Wind speed and direction: near gale S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		ED
12/05/2020	Waterbird Distribution Survey	5km	3:45 starting at 09:15	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
29/05/2020	Waterbird Distribution Survey	5km	3:00 starting at 10:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PM
10/08/2020	Waterbird Distribution Survey	5km	3:30 starting at 08:00	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
24/08/2020	Waterbird Distribution Survey	5km	4:00 starting at 10:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		PM
17/09/2020	Waterbird Distribution Survey	5km	3:00 starting at 07:00	Visibility: moderate; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PC
17/09/2020	Waterbird Distribution Survey	5km	0:50 starting at 10:45	Visibility: moderate; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
24/09/2020	Waterbird Distribution Survey	5km	2:45 starting at 07:00	Visibility: moderate; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		PC
05/10/2020	Waterbird Distribution Survey	5km	3:45 starting at 08:45	Visibility: moderate; Wind speed and direction: strong breeze NW/W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none	Weather closed in during course of morning	PC
23/10/2020	Waterbird Distribution Survey	5km	2:00 starting at 09:15	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PC
23/10/2020	Waterbird Distribution Survey	5km	3:00 starting at 11:15	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PC
02/11/2020	Waterbird Distribution Survey	5km	3:00 starting at 08:30	Visibility: moderate; Wind speed and direction: near gale W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		PC
02/11/2020	Waterbird Distribution Survey	5km	1:00 starting at 11:30	Visibility: moderate; Wind speed and direction: near gale W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		PC
19/11/2020	Waterbird Distribution Survey	5km	1:00 starting at 08:30	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% 150-500m; Rain: heavy showers; Frost: none; Snow: none		PC
19/11/2020	Waterbird Distribution Survey	5km	1:00 starting at 09:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		PC
19/11/2020	Waterbird Distribution Survey	5km	1:00 starting at 10:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		PC
19/11/2020	Waterbird Distribution Survey	5km	1:00 starting at 11:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		PC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
09/12/2020	Waterbird Distribution Survey	5km	1:00 starting at 09:15	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		PC
09/12/2020	Waterbird Distribution Survey	5km	1:00 starting at 10:15	Visibility: moderate; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PC
09/12/2020	Waterbird Distribution Survey	5km	1:00 starting at 11:15	Visibility: moderate; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		PC
09/12/2020	Waterbird Distribution Survey	5km	1:00 starting at 12:15	Visibility: poor; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		PC
18/12/2020	Waterbird Distribution Survey	5km	1:00 starting at 09:30	Visibility: poor; Wind speed and direction: gale W; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		PC
18/12/2020	Waterbird Distribution Survey	5km	1:00 starting at 10:30	Visibility: moderate; Wind speed and direction: gale W; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		PC
18/12/2020	Waterbird Distribution Survey	5km	0:45 starting at 11:30	Visibility: moderate; Wind speed and direction: near gale W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		PC
14/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 10:10	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KOC
14/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 11:10	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KOC
14/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 12:10	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KOC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
14/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 13:40	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KOC
14/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 14:40	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KOC
14/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 15:40	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KOC
28/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 10:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KOC
28/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 11:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KOC
28/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KOC
28/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		KOC
28/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 14:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		KOC
28/01/2021	Waterbird Distribution Survey	5km	1:00 starting at 15:30	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		KOC
01/02/2021	Waterbird Distribution Survey	5km	3:45 starting at 08:15	Visibility: moderate; Wind speed and direction: moderate breeze E; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PDC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
25/02/2021	Waterbird Distribution Survey	5km	1:00 starting at 09:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		PDC
10/03/2021	Waterbird Distribution Survey	5km	1:00 starting at 08:15	Visibility: moderate; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		PDC
10/03/2021	Waterbird Distribution Survey	5km	1:45 starting at 09:15	Visibility: moderate; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		PDC
22/03/2021	Waterbird Distribution Survey	5km	3:45 starting at 08:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PDC

Table 7 - 2 - 5 Breeding Raptor survey effort.

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
20/04/2019	Breeding Raptor Survey	Breeding Raptor Survey	1:00 starting at 12:00	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
20/04/2019	Breeding Raptor Survey	Breeding Raptor Survey	2:30 starting at 13:00	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
20/04/2019	Breeding Raptor Survey	Breeding Raptor Survey	2:00 starting at 15:50	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
20/04/2019	Breeding Raptor Survey	Breeding Raptor Survey	1:00 starting at 17:50	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
30/04/2019	Breeding Raptor Survey	RVP3	2:00 starting at 10:00	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
30/04/2019	Breeding Raptor Survey	RVP4	2:00 starting at 13:00	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
30/04/2019	Breeding Raptor Survey	RVP5	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
30/04/2019	Breeding Raptor Survey	RVP6	1:20 starting at 17:30	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
24/05/2019	Breeding Raptor Survey	RVP1	1:30 starting at 08:10	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
24/05/2019	Breeding Raptor Survey	transect	1:40 starting at 09:40	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
24/05/2019	Breeding Raptor Survey	RVP7	2:40 starting at 11:20	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
24/05/2019	Breeding Raptor Survey	RVP3	1:00 starting at 14:35	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
31/05/2019	Breeding Raptor Survey	RVP6	1:00 starting at 09:00	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		JC
31/05/2019	Breeding Raptor Survey	RVP4	2:00 starting at 10:20	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
31/05/2019	Breeding Raptor Survey	RVP2	2:00 starting at 12:50	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
24/06/2019	Breeding Raptor Survey	RVP6	2:00 starting at 09:45	Visibility: good; Wind speed and direction: light air -; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
25/06/2019	Breeding Raptor Survey	RVP7	1:00 starting at 15:00	Visibility: good; Wind speed and direction: light breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
25/06/2019	Breeding Raptor Survey	RVP7	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
26/06/2019	Breeding Raptor Survey	RVP4	1:00 starting at 15:45	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
26/06/2019	Breeding Raptor Survey	RVP8	2:40 starting at 17:10	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
27/06/2019	Breeding Raptor Survey	RVP2	2:00 starting at 15:45	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
15/07/2019	Breeding Raptor Survey	RVP7	2:59 starting at 10:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JC
15/07/2019	Breeding Raptor Survey	RVP2	1:00 starting at 13:20	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
15/07/2019	Breeding Raptor Survey	RVP4	1:00 starting at 14:30	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
15/07/2019	Breeding Raptor Survey	transect	0:20 starting at 15:40	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
15/07/2019	Breeding Raptor Survey	RVP3	0:25 starting at 16:15	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		JC
15/07/2019	Breeding Raptor Survey	RVP9	1:05 starting at 16:55	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		JC
11/05/2020	Breeding Raptor Survey	RVP1	3:00 starting at 10:00	Visibility: good; Wind speed and direction: light breeze ENE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Cold breeze.	NG
11/05/2020	Breeding Raptor Survey	RVP4	3:00 starting at 17:30	Visibility: good; Wind speed and direction: light breeze ENE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	cold breeze	NG
13/05/2020	Breeding Raptor Survey	RVP3	3:00 starting at 11:00	Visibility: moderate; Wind speed and direction: gentle breeze NNE; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		NG

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
13/05/2020	Breeding Raptor Survey	RVP5	3:00 starting at 18:15	Visibility: good; Wind speed and direction: light air NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		NG
12/06/2020	Breeding Raptor Survey	RVP1	3:00 starting at 15:00	Visibility: moderate; Wind speed and direction: moderate breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		NG
12/06/2020	Breeding Raptor Survey	RVP2	3:00 starting at 06:30	Visibility: poor; Wind speed and direction: fresh breeze NE; Cloud cover and height: 33-66% <150m; Rain: none; Frost: none; Snow: none		NG
26/06/2020	Breeding Raptor Survey	RVP4	2:00 starting at 08:00	Visibility: moderate; Wind speed and direction: light air S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		JK
26/06/2020	Breeding Raptor Survey	RVP5	1:20 starting at 14:10	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		JK
26/06/2020	Breeding Raptor Survey	RVP3	2:00 starting at 12:15	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		JK
26/06/2020	Breeding Raptor Survey	RVP7	2:00 starting at 10:10	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		JK
23/07/2020	Breeding Raptor Survey	RVP1	2:00 starting at 05:30	Visibility: moderate; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		PC
23/07/2020	Breeding Raptor Survey	RVP7	2:00 starting at 07:45	Visibility: poor; Wind speed and direction: moderate breeze N; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		PC
28/07/2020	Breeding Raptor Survey	RVP8	2:00 starting at 05:30	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% <150m; Rain: none; Frost: none; Snow: none		PC

Date	Survey		Duration (h)	Weather Conditions	Comments	Surveyor
28/07/2020	Breeding Raptor Survey	RVP4	2:10 starting at 07:35	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		PC
28/07/2020	Breeding Raptor Survey	RVP3	2:10 starting at 09:55	Visibility: good; Wind speed and direction: strong breeze NW; Cloud cover and height: 33-66% <150m; Rain: light showers; Frost: none; Snow: none	showers moved in later in the morning	PC



APPENDIX 7-3

SUMMARY TABLES

Table of Contents

<i>Table 7 - 3 - 1 Summary of vantage point survey records.....</i>	<i>2</i>
<i>Table 7 - 3 - 2 Summary of winter walkover survey records.....</i>	<i>5</i>
<i>Table 7 - 3 - 3 Summary of breeding walkover records.....</i>	<i>7</i>
<i>Table 7 - 3 - 4 Summary of waterbird distribution survey records.....</i>	<i>8</i>
<i>Table 7 - 3 - 5 Summary of breeding raptor survey records.....</i>	<i>9</i>
<i>Table 7 - 3 - 6 Summary of additional species.....</i>	<i>10</i>
<i>Table 7 - 3 - 7 Summary of supplementary data.....</i>	<i>18</i>

Table 7 - 3 - 1 Summary of vantage point survey records

Species	Year	Observations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Black-headed Gull	2019	number of observations						4		1					5
		flight duration (seconds)						845		40					885
		bird seconds at PCH						74860		630					75490
	2020	number of observations	5			1		8	1						15
		flight duration (seconds)	1906			120		538	67						2631
		bird seconds at PCH	143750			240		1379	67						145436
	2021	number of observations	1	1											2
		flight duration (seconds)	98	82											180
		bird seconds at PCH	98	164											262
Buzzard	2019	number of observations				1	3	9	11	6	3	4	1	6	44
		flight duration (seconds)				25	405	890	1465	460	397	318	75	206	4241
		bird seconds at PCH				25	405	985	1735	560	634	546	75	45	5010
	2020	number of observations	2	6	2	9	2	6	3	6	2	8	6	2	54
		flight duration (seconds)	75	1050	155	1075	95	335		2262	215	885	89	89	6325
		bird seconds at PCH	10	2509	155	1255	90	322		4914	99	500			9854
	2021	number of observations	2	5	2										9
		flight duration (seconds)	81	125	63										269
		bird seconds at PCH	81	186	19										286
Kestrel	2019	number of observations							13	2	2	1	5	1	24
		flight duration (seconds)							2860	160	145	217	473	108	3963
		bird seconds at PCH							3485	110	145	217	443	108	4508
	2020	number of observations	1	1		8				2	6	1			19
		flight duration (seconds)	35	81		1230				62	147	165			1720
		bird seconds at PCH	35	81		1225				62	86	120			1609
	2021	number of observations		1											1

Species	Year	Observations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
		flight duration (seconds)		136											136
		bird seconds at PCH		136											
Lapwing	2019	number of observations										1	1		2
		flight duration (seconds)										125	100		225
		bird seconds at PCH										2750	1600		4350
	2020	number of observations	4	1									4	1	10
		flight duration (seconds)	994	500									321	125	1940
		bird seconds at PCH	75874	75000									10066	12500	173440
	2021	number of observations	5												5
		flight duration (seconds)	520												520
		bird seconds at PCH	29119												29119
	Mallard	2019	number of observations							1			1		
flight duration (seconds)									60						60
bird seconds at PCH									60						60
2020		number of observations		1		5		2	3	2			1		14
		flight duration (seconds)				230		64	84	70			16		464
		bird seconds at PCH				390		236	37	220					883
2021		number of observations			1										1
		flight duration (seconds)			39										39
		bird seconds at PCH			78										78
Peregrine Falcon	2019	number of observations							2			3			5
		flight duration (seconds)							121			25			146
		bird seconds at PCH							121			15			136
	2020	number of observations		2			1			1					4
		flight duration (seconds)		618			20			180					818
		bird seconds at PCH		618						180					798

Species	Year	Observations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	2021	number of observations			1										1
		flight duration (seconds)			36										36
		bird seconds at PCH			72										72
Snipe	2019	number of observations										2	1	6	9
		flight duration (seconds)										10	20	160	190
		bird seconds at PCH												166	166
	2020	number of observations													
		flight duration (seconds)													
		bird seconds at PCH													
	2021	number of observations	2												2
		flight duration (seconds)	298												298
		bird seconds at PCH	298												298
Sparrowhawk	2019	number of observations							3		1				4
		flight duration (seconds)							610		76				686
		bird seconds at PCH							470		76				546
	2020	number of observations		1	1		1						1		4
		flight duration (seconds)		20	300		5						12		337
		bird seconds at PCH		20	300										320
	2021	number of observations		1	1										2
		flight duration (seconds)		18	15										33
		bird seconds at PCH		18											18
Teal	2019	number of observations													
		flight duration (seconds)													
		bird seconds at PCH													
	2020	number of observations													
		flight duration (seconds)													

Species	Year	Observations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
		bird seconds at PCH													
	2021	number of observations			1										1
		flight duration (seconds)			16										16
		bird seconds at PCH			64										64

Table 7 - 3 - 2 Summary of winter walkover survey records

Species	Year	Abundance	Jan	Feb	Mar	Oct	Nov	Dec	Total
Buzzard	2019	number of observations				1		5	6
		number of individuals				1		7	8
	2020	number of observations	1		1	3			5
		number of individuals	1		1	3			5
	2021	number of observations		4	2				6
		number of individuals		6	4				10
Kestrel	2019	number of observations							
		number of individuals							
	2020	number of observations				1			1
		number of individuals				1			1
	2021	number of observations			2				2
		number of individuals			2				2
Lapwing	2019	number of observations						1	1
		number of individuals						24	24
	2020	number of observations							
		number of individuals							
	2021	number of observations	1						1
		number of individuals	6						6

Species	Year	Abundance	Jan	Feb	Mar	Oct	Nov	Dec	Total
Mallard	2019	number of observations							
		number of individuals							
	2020	number of observations	1			1			2
		number of individuals	2			3			5
	2021	number of observations			1				1
		number of individuals			2				2
Peregrine Falcon	2019	number of observations							
		number of individuals							
	2020	number of observations							
		number of individuals							
	2021	number of observations	1						1
		number of individuals	1						1
Snipe	2019	number of observations				4		3	7
		number of individuals				8		12	20
	2020	number of observations	3						3
		number of individuals	10						10
	2021	number of observations	8						8
		number of individuals	9						9
Sparrowhawk	2019	number of observations							
		number of individuals							
	2020	number of observations				1			1
		number of individuals				1			1
	2021	number of observations		1					1
		number of individuals		1					1
Teal	2019	number of observations						1	1
		number of individuals						2	2

Species	Year	Abundance	Jan	Feb	Mar	Oct	Nov	Dec	Total
	2020	number of observations	1						1
		number of individuals	7						7
	2021	number of observations	2						2
		number of individuals	11						11

Table 7 - 3 - 3 Summary of breeding walkover records

Species	Year	Abundance	Apr	May	Jun	Jul	Aug	Sep	Total
Black-headed Gull	2019	number of observations							
		number of individuals							
	2020	number of observations			1				1
		number of individuals			1				1
Buzzard	2019	number of observations	4	1	1				6
		number of individuals	6	1	3				10
	2020	number of observations		2		2			4
		number of individuals		2		3			5
Kestrel	2019	number of observations							
		number of individuals							
	2020	number of observations			1				1
		number of individuals			1				1
Lapwing	2019	number of observations							
		number of individuals							
	2020	number of observations		1	1	1			3
		number of individuals		1	20	18			39
Mallard	2019	number of observations		1					1
		number of individuals		1					1

Species	Year	Abundance	Apr	May	Jun	Jul	Aug	Sep	Total
Merlin	2020	number of observations		2					2
		number of individuals		13					13
	2019	number of observations							
		number of individuals							
	2020	number of observations		1					1
		number of individuals		1					1

Table 7 - 3 - 4 Summary of waterbird distribution survey records

Species	Year	Abundance	Jan	Feb	Mar	Apr	May	Aug	Sep	Oct	Nov	Dec	Total
Black-headed Gull	2019	number of observations											
		number of individuals											
	2020	number of observations											
		number of individuals											
	2021	number of observations		1									1
		number of individuals		14									14
Lapwing	2019	number of observations											
		number of individuals											
	2020	number of observations								1	2		3
		number of individuals								1	3		4
	2021	number of observations	1	1									2
		number of individuals	23	67									90
Mallard	2019	number of observations							1		1		2
		number of individuals							8		2		10
	2020	number of observations		3	3		1		1	1	2	2	13
		number of individuals		14	8		3		1	2	8	3	39

Species	Year	Abundance	Jan	Feb	Mar	Apr	May	Aug	Sep	Oct	Nov	Dec	Total
	2021	number of observations	3	2	3								8
		number of individuals	21	6	9								36
Snipe	2019	number of observations											
		number of individuals											
	2020	number of observations					2		2		2	1	7
		number of individuals					2		2		9	30	43
	2021	number of observations	9	1	1								11
		number of individuals	12	1	1								14
Teal	2019	number of observations											
		number of individuals											
	2020	number of observations										1	1
		number of individuals										1	1
	2021	number of observations	2		1								3
		number of individuals	33		5								38

Table 7 - 3 - 5 Summary of breeding raptor survey records

Species	Year	Abundance	Apr	May	Jun	Jul	Total
Buzzard	2019	number of observations	1	5	2	3	11
		number of individuals	1	6	2	3	12
	2020	number of observations		7	7	4	18
		number of individuals		7		5	
Kestrel	2019	number of observations	1	1	1		3
		number of individuals	1	1	1		3
	2020	number of observations			2		2
		number of individuals			2		2

Species	Year	Abundance	Apr	May	Jun	Jul	Total
Merlin	2019	number of observations					
		number of individuals					
	2020	number of observations		1		1	2
		number of individuals		1		1	2
Sparrowhawk	2019	number of observations	2	2	3	1	8
		number of individuals	2	2	3	1	8
	2020	number of observations					
		number of individuals					

Table 7 - 3 - 6 Summary of additional species (species recorded during surveys that are not key ornithological receptors)

Species	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Barn Swallow	2019				✓	✓	✓		✓	✓			
	2020					✓	✓	✓	✓	✓	✓		
	2021												
Blackbird	2019				✓	✓	✓		✓		✓	✓	✓
	2020	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓									
Blackcap	2019				✓	✓	✓						
	2020						✓						
	2021												
Blue Tit	2019					✓							✓
	2020	✓		✓			✓	✓		✓	✓	✓	✓
	2021		✓	✓									
Bullfinch	2019												✓
	2020			✓			✓	✓		✓	✓	✓	

Species	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2021			✓									
Chaffinch	2019				✓	✓	✓		✓	✓	✓	✓	✓
	2020	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓									
Chiffchaff	2019												
	2020			✓		✓	✓	✓		✓			
	2021			✓									
Coal Tit	2019				✓	✓	✓						✓
	2020	✓									✓		
	2021		✓	✓									
Collared Dove	2019				✓	✓	✓						
	2020												
	2021			✓									
Redpoll	2019												
	2020						✓	✓		✓		✓	
	2021												
Cormorant	2019										✓	✓	✓
	2020		✓	✓						✓		✓	✓
	2021	✓	✓	✓									
Dunnock	2019				✓	✓				✓			✓
	2020			✓		✓	✓	✓				✓	✓
	2021		✓	✓									
Fieldfare	2019											✓	✓
	2020	✓	✓	✓							✓	✓	✓
	2021	✓	✓	✓									
Goldcrest	2019												

Species	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2020							✓			✓	✓	✓
	2021		✓	✓									
Golden Plover	2019										✓		
	2020									✓	✓	✓	
	2021												
Goldfinch	2019					✓			✓	✓	✓	✓	✓
	2020	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓											
Grasshopper Warbler	2019												
	2020							✓					
	2021												
Great Black-backed Gull	2019								✓				
	2020				✓								
	2021												
Great Crested Grebe	2019											✓	
	2020										✓		✓
	2021			✓									
Great Tit	2019				✓	✓	✓			✓	✓		✓
	2020	✓	✓	✓			✓	✓	✓		✓	✓	
	2021		✓	✓									
Greenfinch	2019								✓				
	2020						✓	✓					
	2021			✓									
Grey Heron	2019				✓		✓	✓		✓	✓	✓	✓
	2020					✓			✓	✓	✓	✓	✓
	2021	✓	✓	✓									

Species	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Grey Wagtail	2019												
	2020						✓						
	2021												
Herring Gull	2019				✓	✓	✓		✓				
	2020					✓							
	2021												
Hooded Crow	2019				✓		✓		✓		✓	✓	
	2020	✓	✓	✓		✓		✓		✓	✓	✓	✓
	2021	✓	✓	✓									
House Martin	2019						✓		✓				
	2020						✓	✓	✓				
	2021												
House Sparrow	2019								✓				✓
	2020												
	2021		✓	✓									
Jack Snipe	2019												✓
	2020												
	2021												
Jackdaw	2019				✓	✓	✓		✓	✓	✓	✓	✓
	2020	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓									
Jay	2019												
	2020	✓								✓			
	2021												
Lesser Black-backed Gull	2019				✓	✓	✓	✓	✓				
	2020		✓		✓	✓	✓	✓	✓				

Species	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2021		✓										
Lesser Redpoll	2019												✓
	2020												
	2021												
Linnet	2019								✓		✓		✓
	2020					✓	✓	✓		✓	✓	✓	✓
	2021		✓	✓									
Little Grebe	2019											✓	
	2020		✓	✓		✓							
	2021	✓											
Long-tailed Tit	2019												✓
	2020	✓					✓	✓		✓	✓	✓	✓
	2021		✓	✓									
Magpie	2019				✓		✓		✓		✓	✓	
	2020	✓	✓					✓		✓	✓	✓	✓
	2021	✓	✓	✓									
Meadow Pipit	2019				✓	✓	✓						
	2020			✓		✓	✓	✓		✓	✓	✓	✓
	2021		✓	✓									
Mistle Thrush	2019				✓	✓	✓		✓	✓	✓		
	2020	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
	2021		✓	✓									
Moorhen	2019												
	2020	✓	✓	✓						✓	✓	✓	✓
	2021	✓	✓	✓									
Mute Swan	2019											✓	✓

Species	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2020	✓	✓	✓					✓	✓			✓
	2021	✓	✓	✓									
Pheasant	2019				✓	✓	✓				✓	✓	✓
	2020	✓	✓			✓	✓					✓	
	2021	✓											
Pied Wagtail	2019				✓	✓	✓				✓		✓
	2020			✓			✓	✓		✓	✓	✓	✓
	2021		✓	✓									
Raven	2019					✓			✓		✓	✓	✓
	2020	✓	✓			✓	✓	✓	✓	✓		✓	✓
	2021	✓	✓	✓									
Redwing	2019										✓	✓	✓
	2020	✓	✓								✓	✓	✓
	2021	✓	✓	✓									
Reed Bunting	2019												
	2020	✓					✓						
	2021		✓										
Reed Warbler	2019												
	2020			✓									
	2021												
Ringed Plover	2019						✓						
	2020												
	2021												
Robin	2019				✓	✓	✓		✓		✓	✓	✓
	2020	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓									

Species	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rook	2019				✓	✓	✓		✓	✓	✓	✓	✓
	2020	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓									
Sand Martin	2019				✓	✓	✓						
	2020					✓	✓	✓	✓	✓			
	2021												
Sedge Warbler	2019				✓								
	2020						✓						
	2021												
Skylark	2019				✓	✓	✓						
	2020						✓						
	2021		✓	✓									
Song Thrush	2019				✓	✓	✓		✓		✓	✓	✓
	2020	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓									
Spotted Flycatcher	2019						✓						
	2020												
	2021												
Starling	2019						✓		✓	✓	✓	✓	✓
	2020	✓	✓	✓			✓	✓		✓	✓	✓	✓
	2021	✓	✓	✓									
Stock Dove	2019												
	2020							✓			✓	✓	
	2021												
Stonechat	2019						✓						
	2020										✓	✓	

Species	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2021												
Swift	2019					✓							
	2020					✓							
	2021												
Tufted Duck	2019												
	2020		✓										
	2021		✓	✓									
Water Rail	2019												
	2020			✓						✓	✓	✓	✓
	2021		✓										
Whinchat	2019												
	2020							✓					
	2021												
Whitethroat	2019												
	2020						✓						
	2021												
Whooper Swan	2019												
	2020										✓	✓	
	2021			✓									
Willow Warbler	2019				✓		✓						
	2020					✓	✓	✓					
	2021												
Woodpigeon	2019				✓	✓	✓		✓	✓	✓	✓	✓
	2020	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓									
Wren	2019				✓	✓	✓		✓	✓	✓		✓

Species	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2020	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	2021		✓	✓									

Table 7 - 3 - 7 Summary of supplementary data (key ornithological receptor species records from additional vantage points)

Species	Year	Abundance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Black-headed Gull	2019	number of observations						2							2
		number of individuals						12							12
Buzzard	2019	number of observations					2	3	22	3					30
		number of individuals					2	3	33	3					41
Kestrel	2019	number of observations							1	6					7
		number of individuals							1	6					7
Sparrowhawk	2019	number of observations						3	7	2					12
		number of individuals						3	8	2					13



APPENDIX 7-4

***SURVEY DATA & FIGURES (I.E.
FLIGHTLINE MAPS)***

Table of Contents

1. WHOOPER SWAN	6
2. GOLDEN PLOVER.....	11
3. PEREGRINE FALCON	15
4. LAPWING	19
5. TUFTED DUCK.....	28
6. BLACK-HEADED GULL	30
7. LITTLE GREBE	39
8. MALLARD.....	41
9. TEAL.....	51
10. SNIPE	56
11. KESTREL.....	65
12. BUZZARD.....	78
13. SPARROWHAWK.....	103

TABLE OF TABLES

<i>Table 7 - 4 - 1 Whooper Swan Vantage Point Survey</i>	6
<i>Table 7 - 4 - 2 Whooper Swan Winter Walkover Survey</i>	7
<i>Table 7 - 4 - 3 Whooper Swan Waterbird Distribution Survey</i>	7
<i>Table 7 - 4 - 4 Golden Plover Vantage Point Survey</i>	11
<i>Table 7 - 4 - 5 Golden Plover Winter Walkover Survey</i>	12
<i>Table 7 - 4 - 6 Peregrine Vantage Point Survey</i>	15
<i>Table 7 - 4 - 7 Peregrine Winter Walkover Survey</i>	16
<i>Table 7 - 4 - 8 Lapwing Vantage Point Survey</i>	19
<i>Table 7 - 4 - 9 Lapwing Winter Walkover Survey</i>	21
<i>Table 7 - 4 - 10 Lapwing Breeding Walkover Survey</i>	21
<i>Table 7 - 4 - 11 Lapwing Waterbird Distribution Survey</i>	21
<i>Table 7 - 4 - 12 Lapwing Incidental Records</i>	22
<i>Table 7 - 4 - 13 Tufted Duck Waterbird Distribution Surveys</i>	28
<i>Table 7 - 4 - 14 Black-headed Gull Vantage Point Survey</i>	30
<i>Table 7 - 4 - 15 Black-headed Gull Breeding Walkover Survey</i>	32
<i>Table 7 - 4 - 16 Black-headed Gull Waterbird Distribution Survey</i>	32
<i>Table 7 - 4 - 17 Black-headed Gull Incidental Records</i>	32
<i>Table 7 - 4 - 18 Black-headed Gull Supplementary Data</i>	33
<i>Table 7 - 4 - 19 Little Grebe Waterbird Distribution Surveys</i>	39
<i>Table 7 - 4 - 20 Mallard Vantage Point Survey</i>	41
<i>Table 7 - 4 - 21 Mallard Vantage Point Survey (non-flights)</i>	42
<i>Table 7 - 4 - 22 Mallard Winter Walkover Survey</i>	43
<i>Table 7 - 4 - 23 Mallard Breeding Walkover Survey</i>	43
<i>Table 7 - 4 - 24 Mallard Waterbird Distribution Survey</i>	43
<i>Table 7 - 4 - 25 Mallard Incidental Records</i>	45
<i>Table 7 - 4 - 26 Teal Vantage Point Survey</i>	51
<i>Table 7 - 4 - 27 Teal Winter Walkover Survey</i>	51
<i>Table 7 - 4 - 28 Teal Waterbird Distribution Survey</i>	52
<i>Table 7 - 4 - 29 Snipe Vantage Point Survey</i>	56
<i>Table 7 - 4 - 30 Snipe Winter Walkover Survey</i>	57
<i>Table 7 - 4 - 31 Snipe Waterbird Distribution Survey</i>	58
<i>Table 7 - 4 - 32 Snipe Incidental Records</i>	60
<i>Table 7 - 4 - 33 Kestrel Vantage Point Survey</i>	65
<i>Table 7 - 4 - 34 Kestrel Winter Walkover Survey</i>	70
<i>Table 7 - 4 - 35 Kestrel Breeding Raptor Survey</i>	70
<i>Table 7 - 4 - 36 Kestrel Incidental Records</i>	71
<i>Table 7 - 4 - 37 Kestrel Supplementary Data</i>	71
<i>Table 7 - 4 - 38 Buzzard Vantage Point Survey (flights)</i>	78
<i>Table 7 - 4 - 39 Buzzard Vantage Point Survey (non-flight)</i>	87
<i>Table 7 - 4 - 40 Buzzard Winter Walkover Survey</i>	88



Table 7 - 4 - 41 Buzzard Breeding Walkover Survey.....89

Table 7 - 4 - 42 Buzzard Breeding Raptor Survey.....90

Table 7 - 4 - 43 Buzzard Incidental Records.....93

Table 7 - 4 - 44 Buzzard Supplementary Data.....93

Table 7 - 4 - 45 Sparrowhawk Vantage Point Survey.....103

Table 7 - 4 - 46 Sparrowhawk Winter Walkover Survey.....104

Table 7 - 4 - 47 Sparrowhawk Breeding Raptor Survey.....105

Table 7 - 4 - 48 Sparrowhawk Incidental Records.....105

Table 7 - 4 - 49 Sparrowhawk Supplementary Data.....106

TABLE OF FIGURES

<i>Figure 7 - 4 - 1 Whooper Swan Vantage Point Survey.....</i>	<i>8</i>
<i>Figure 7 - 4 - 2 Whooper Swan Winter Walkover Survey.....</i>	<i>9</i>
<i>Figure 7 - 4 - 3 Whooper Swan Waterbird Distribution Survey.....</i>	<i>10</i>
<i>Figure 7 - 4 - 4 Golden Plover Vantage Point Survey.....</i>	<i>13</i>
<i>Figure 7 - 4 - 5 Golden Plover Winter Walkover Survey.....</i>	<i>14</i>
<i>Figure 7 - 4 - 6 Peregrine Falcon Vantage Point Survey.....</i>	<i>17</i>
<i>Figure 7 - 4 - 7 Peregrine Falcon Winter Walkover Survey.....</i>	<i>18</i>
<i>Figure 7 - 4 - 8 Lapwing Vantage Point Survey.....</i>	<i>23</i>
<i>Figure 7 - 4 - 9 Lapwing Winter Walkover Survey.....</i>	<i>24</i>
<i>Figure 7 - 4 - 10 Lapwing Breeding Walkover Survey.....</i>	<i>25</i>
<i>Figure 7 - 4 - 11 Lapwing Waterbird Distribution Survey.....</i>	<i>26</i>
<i>Figure 7 - 4 - 12 Lapwing Incidental Records.....</i>	<i>27</i>
<i>Figure 7 - 4 - 13 Tufted Duck Waterbird Distribution Survey.....</i>	<i>29</i>
<i>Figure 7 - 4 - 14 Black-headed Gull Vantage Point Surveys.....</i>	<i>34</i>
<i>Figure 7 - 4 - 15 Black-headed Gull Vantage Point Breeding Walkover Surveys.....</i>	<i>35</i>
<i>Figure 7 - 4 - 16 Black-headed Gull Waterbird Distribution Surveys.....</i>	<i>36</i>
<i>Figure 7 - 4 - 17 Black-headed Gull Incidental Records.....</i>	<i>37</i>
<i>Figure 7 - 4 - 18 Black-headed Gull Supplementary Data.....</i>	<i>38</i>
<i>Figure 7 - 4 - 19 Little Grebe Waterbird Distribution Surveys.....</i>	<i>40</i>
<i>Figure 7 - 4 - 20 Mallard Vantage Point Survey.....</i>	<i>46</i>
<i>Figure 7 - 4 - 21 Mallard Winter Walkover Survey.....</i>	<i>47</i>
<i>Figure 7 - 4 - 22 Mallard Breeding Walkover Survey.....</i>	<i>48</i>
<i>Figure 7 - 4 - 23 Mallard Waterbird Distribution Survey.....</i>	<i>49</i>
<i>Figure 7 - 4 - 24 Mallard Incidental Records.....</i>	<i>50</i>
<i>Figure 7 - 4 - 25 Teal Vantage Point Survey.....</i>	<i>53</i>
<i>Figure 7 - 4 - 26 Teal Winter Walkover Survey.....</i>	<i>54</i>
<i>Figure 7 - 4 - 27 Teal Waterbird Distribution Survey.....</i>	<i>55</i>
<i>Figure 7 - 4 - 28 Snipe Vantage Point Survey.....</i>	<i>61</i>
<i>Figure 7 - 4 - 29 Snipe Winter Walkover Survey.....</i>	<i>62</i>
<i>Figure 7 - 4 - 30 Snipe Waterbird Distribution Survey.....</i>	<i>63</i>
<i>Figure 7 - 4 - 31 Snipe Incidental Records.....</i>	<i>64</i>
<i>Figure 7 - 4 - 32 Kestrel Vantage Point Survey.....</i>	<i>73</i>
<i>Figure 7 - 4 - 33 Kestrel Winter Walkover Survey.....</i>	<i>74</i>
<i>Figure 7 - 4 - 34 Kestrel Breeding Raptor Survey.....</i>	<i>75</i>
<i>Figure 7 - 4 - 35 Kestrel Incidental Records.....</i>	<i>76</i>
<i>Figure 7 - 4 - 36 Kestrel Supplementary Data.....</i>	<i>77</i>
<i>Figure 7 - 4 - 37 Buzzard Vantage Point Survey.....</i>	<i>97</i>
<i>Figure 7 - 4 - 38 Buzzard Winter Walkover Survey.....</i>	<i>98</i>
<i>Figure 7 - 4 - 39 Buzzard Breeding Walkover Survey.....</i>	<i>99</i>
<i>Figure 7 - 4 - 40 Buzzard Breeding Raptor Survey.....</i>	<i>100</i>



Figure 7 - 4 - 41 Buzzard Incidental Records.....101

Figure 7 - 4 - 42 Buzzard Supplementary Data.....102

Figure 7 - 4 - 43 Sparrowhawk Vantage Point Survey.....108

Figure 7 - 4 - 44 Sparrowhawk Winter Walkover Survey.....109

Figure 7 - 4 - 45 Sparrowhawk Breeding Raptor Survey.....110

Figure 7 - 4 - 46 Sparrowhawk Incidental Records.....111

Figure 7 - 4 - 47 Sparrowhawk Supplementary Data.....112

1.

WHOOPER SWAN

Table 7-4-1 Whooper Swan Vantage Point Survey

Map Ref.	VP	Date	Time	Species	Number	¹ Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
WS001	VP1	04/11/2020	08:15	Whooper Swan	5	35	35	0	0	0	improved agricultural grassland and hedgerows; travelled north to south across the viewshed past the vp.	PC
WS002	VP3	05/11/2020	08:50	Whooper Swan	2	48	0	0	48	0	improved agricultural grassland, hedgerows and conifer plantation; travelled north to south across the viewshed past the vp.	PC
WS003	VP3	05/11/2020	09:45	Whooper Swan	3	97	0	0	97	0	improved agricultural grassland, hedgerows and conifer plantation; travelled north to south across the viewshed past the vp. initially heard calling then picked up straight after 1009.	PC
WS004	VP3	23/03/2021	08:27	Whooper Swan	21	72	0	0	72	0	improved grassland and active quarries and mines; flew across viewshed heading nw in classic v formation	PDC

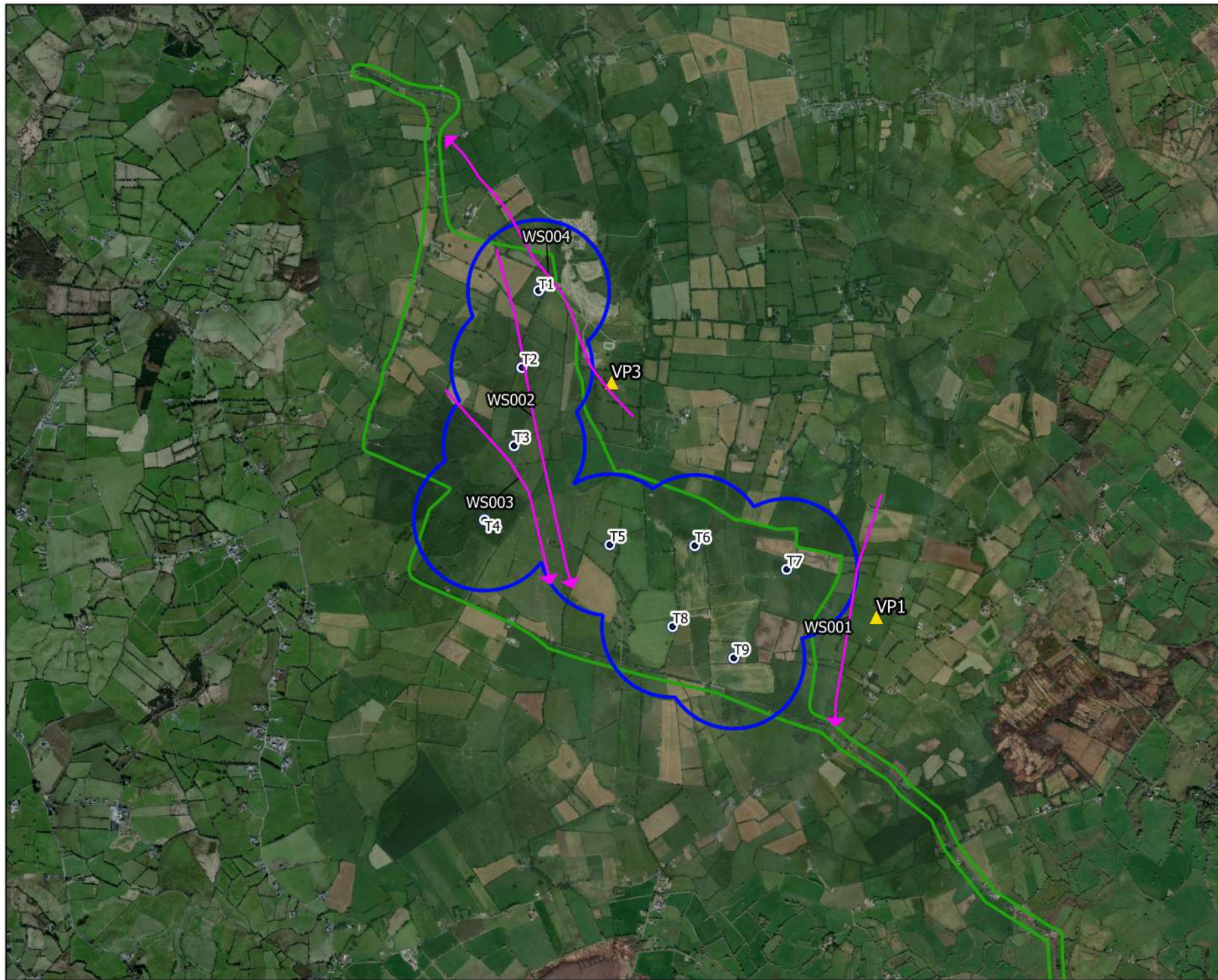
¹ Note: Throughout this document, for Vantage Point surveys undertaken between October 2019 and January 2020, only flight durations within 500m of the Wind Farm Site are shown for each height band. For all other Vantage Point Surveys, total flight durations (both inside and outside 500m radius) are shown for each height band.

Table 7 - 4 - 2 Whooper Swan Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
WS001	27/10/2020	10:10	Whooper Swan	9	improved agricultural grassland and hedgerows; flew off site and over the road, heading south west, calling, flew off site and over the road, heading south west, calling (wintering)	PC

Table 7 - 4 - 3 Whooper Swan Waterbird Distribution Survey

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
WS001	Lough Sewdy	19/11/2020	10:00	Whooper Swan	7	limestone/marl lakes and improved agricultural grassland; flew over lake from behind island off to north east	PC



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ VP Locations
- Flight Observation



Drawing Title

**Whooper Swan Vantage Point
Survey Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-1

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title

**Whooper Swan Winter Walkover
Survey Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-2

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIAR Site Boundary
-  Turbine Layout
-  5km Survey Radius
-  Observation



Drawing Title:
**Whooper Swan Waterbird
Distribution Survey Observations**

Project Title:
**Umma More Renewable Energy
Development**

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-3
Scale: 1:75000	Date: 31.01.23

 **MKO**
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie

2.

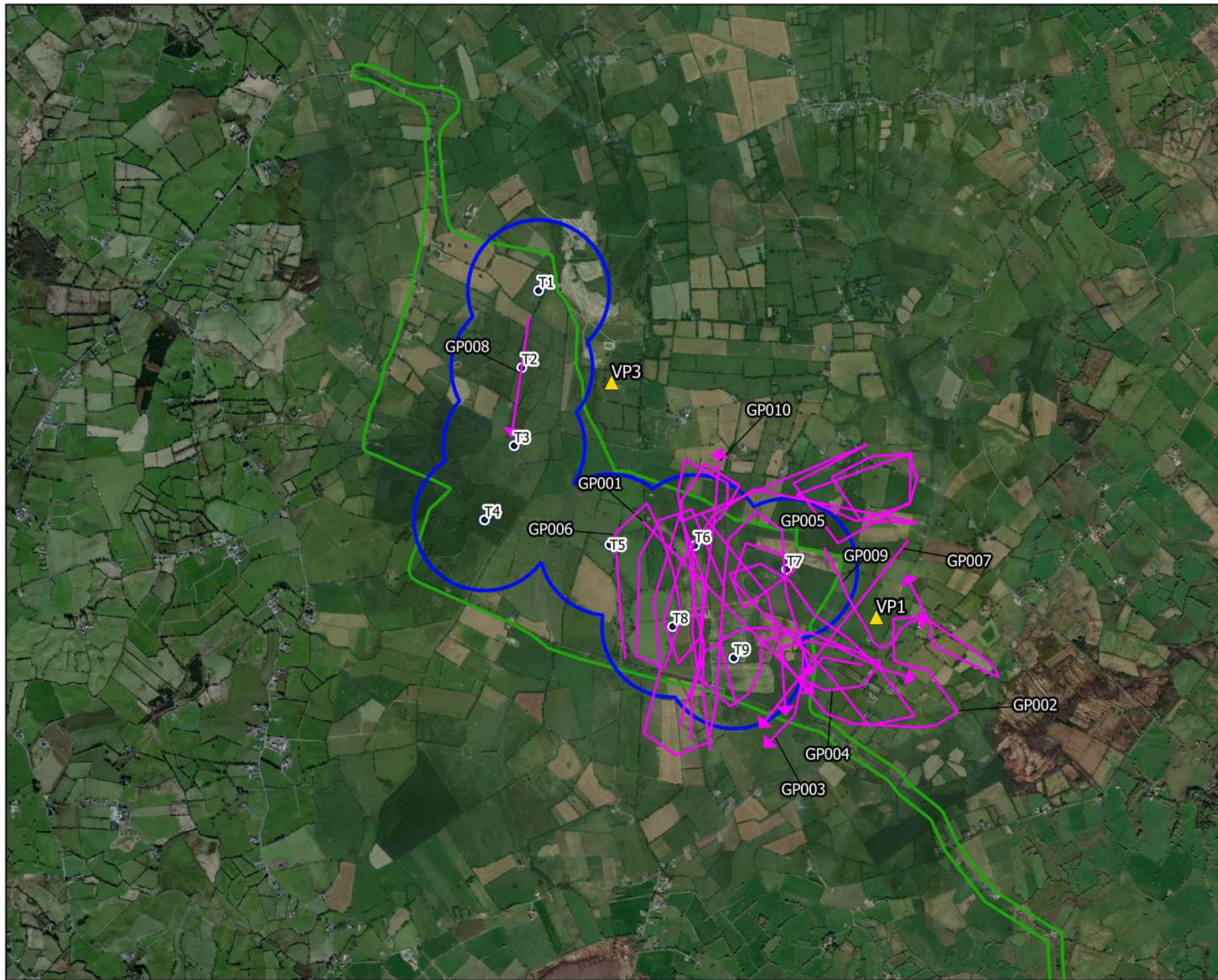
GOLDEN PLOVER

Table 7 - 4 - 4 Golden Plover Vantage Point Survey

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
GP001	VP1	16/10/2019	16:57	Golden Plover	32	105	0	0	105	0	improved agricultural grassland; travelling	PM
GP002	VP1	16/10/2019	17:05	Golden Plover	32	311	0	0	30	0	improved agricultural grassland; traveling/circling	PM
GP003	VP1	16/10/2019	17:24	Golden Plover	23	732	0	0	682	0	improved agricultural grassland; circling/travelling	PM
GP004	VP1	16/10/2019	17:38	Golden Plover	29	158	0	0	120	0	improved agricultural grassland; travelling	PM
GP005	VP1	16/10/2019	17:57	Golden Plover	48	141	0	0	141	0	improved agricultural grassland; travelling	PM
GP006	VP1	16/10/2019	18:31	Golden Plover	58	1731	0	200	1000	0	improved agricultural grassland; circling	PM
GP007	VP1	16/10/2019	18:38	Golden Plover	16	100	0	0	85	0	improved agricultural grassland; travelling	PM
GP008	VP3	24/10/2019	18:39	Golden Plover	5	20	0	20	0	0	improved agricultural grassland; travelling; calling	PM
GP009	VP1	18/09/2020	08:40	Golden Plover	4	26	26	0	0	0	improved agricultural grassland; came up, calling, from below vp, not sure where exactly. flew over vp heading east.	PC
GP010	VP1	12/10/2020	15:00	Golden Plover	c60	35	0	0	35	0	improved agricultural grassland and conifer plantation; flock flying south to north over viewshed. count is approximate due to distance between me and birds. lost in distance.	PC

Table 7 - 4 - 5 Golden Plover Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
GP001	27/10/2020	09:20	Golden Plover	20	improved agricultural grassland and hedgerows; in flight in distance, approximate number. in flight in distance (wintering)	PC



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ VP Locations
- Flight Observation



Drawing Title

**Golden Plover Vantage Point
Survey Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-4

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title

**Golden Plover Winter Walkover
Survey Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-5

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie

3.

PEREGRINE FALCON

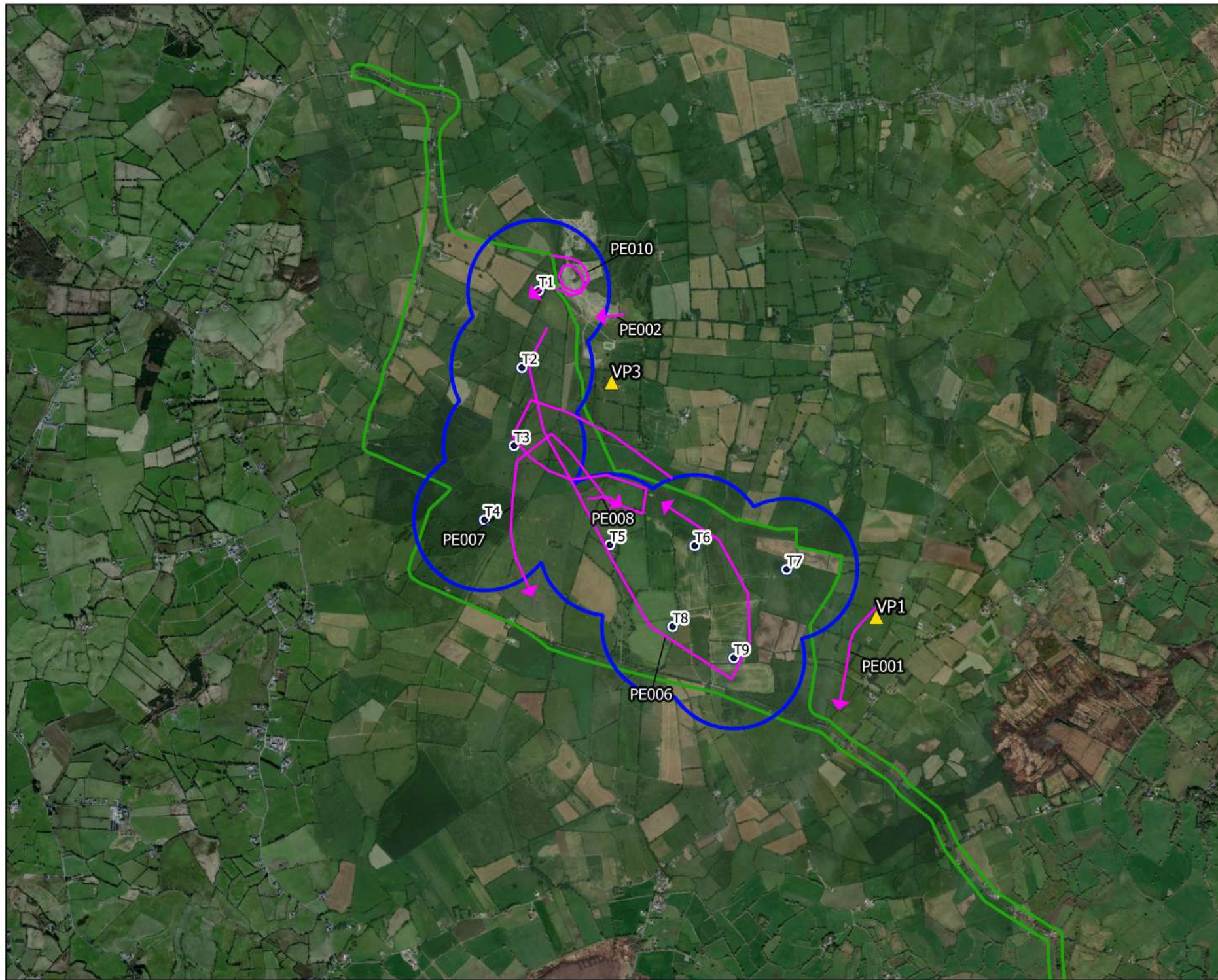
Table 7 - 4 - 6 Peregrine Vantage Point Survey

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
PE001	VP1	16/07/2019	19:52	Peregrine Falcon	1	98	0	0	98	0	improved agricultural grassland and hedgerows; pe flew with prey over gal with w11. lost from view behind trees.	PW
PE002	VP3	17/07/2019	17:54	Peregrine Falcon	1	23	0	23	0	0	active quarries and mines; flew for 23 seconds and perched on a gravel spoil head in the quarry. preened and defecated. this pe was still present on finishing the survey at 18:30. at 18:11 another falcon was seen for 1 second flying in the quarry behind an ash tree. , present perched for 35 minutes	PW
PE003	VP1	16/10/2019	15:26	Peregrine Falcon	1	158	0	0	0	0	improved agricultural grassland; travelling/hunting	PM
PE004	VP3	24/10/2019	16:51	Peregrine Falcon	1	15	0	15	0	0	active quarries and mines; juvenile; travelling; landed on gravel pile for about 20mins	PM
PE005	VP3	24/10/2019	17:15	Peregrine Falcon	1	10	10	0	0	0	active quarries and mines; juvenile flew from gravel pile	PM
PE006	VP3	13/02/2020	14:12	Peregrine Falcon	1	264	0	0	264	0	improved agricultural grassland and wet grassland; travelling/hunting; flight ended in stoop	PM
PE007	VP3	13/02/2020	14:35	Peregrine Falcon	1	354	0	0	354	0	improved agricultural grassland; hunting	PM

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
PE008	VP3	14/05/2020	06:35	Peregrine Falcon	1	20	20	0	0	0	tilled land and cultivated land; flew down from perch , suspected pe, however not a positive id	NG
PE009	VP3	26/08/2020	16:07	Peregrine Falcon	1	205	0	0	180	0	improved agricultural grassland and wet grassland; hunting; stooped at end of flight; juvenile	PM
PE010	VP3	23/03/2021	08:10	Peregrine Falcon	2	36	0	15	21	0	active quarries and mines and improved grassland; display over quarry, birds flipping over going talon to talon, stooping and chasing each other, headed west low over fields, lost against background	PDC

Table 7 - 4 - 7 Peregrine Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
PE001	08/01/2021	15:15	Peregrine Falcon	1	improved agricultural grassland and active quarries and mines; perching, gliding, perching on a tree, then gliding towards a quarry (wintering)	KOC



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ VP Locations
- Flight Observation



Drawing Title

**Peregrine Vantage Point Survey
Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-6

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title:
**Peregrine Winter Walkover Survey
Observations**

Project Title:
**Umma More Renewable Energy
Development**

Drawn By: D. Woods	Checked By: P. Cregg
Project No. 201050	Drawing No. Fig. 7-4-7
Scale 1:35000	Date 31.01.23



MKO
Planning and
Environmental
Consultants
Tuan Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie

4.

LAPWING

Table 7 - 4 - 8 Lapwing Vantage Point Survey

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
L001	VP1	16/10/2019	13:46	Lapwing	22	125	0	0	125	0	improved agricultural grassland; travelling	PM
L002	VP1	13/11/2019	08:25	Lapwing	16	207	0	0	100	0	improved agricultural grassland; travelling	PM
L003	VP1	16/01/2020	11:36	Lapwing	1	66	0	66	0	0	improved agricultural grassland and wet grassland; travelling; landed in wet field	PM
L004	VP1	16/01/2020	11:48	Lapwing	103	508	58	250	200	0	wet grassland and improved agricultural grassland; circling; landed in wet field	PM
L005	VP1	16/01/2020	12:55	Lapwing	103	386	100	286	0	0	wet grassland and improved agricultural grassland; circling before landing again	PM
L006	VP1	16/01/2020	13:33	Lapwing	12	34	34	0	0	0	wet grassland; circling before landing again	PM
L007	VP3	13/02/2020	14:05	Lapwing	150	657	0	0	350	150	improved agricultural grassland, wet grassland and mixed broadleaved/conifer woodland; circling/travelling	PM
L008	VP3	05/11/2020	08:50	Lapwing	3	11	0	11	0	0	improved agricultural grassland, hedgerows and conifer plantation; picked up whilst following ws005. watched briefly then went back to ws so timing is the length of time i watched them as i was still timing ws005. also heard calling.	PC
L009	VP3	05/11/2020	09:40	Lapwing	40	251	41	0	210	0	improved agricultural grassland, hedgerows and conifer plantation; circling over site, apparently looking for	PC

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
											somewhere to land. eventually came down in field with standing water in it.	
L010	VP3	05/11/2020	10:44	Lapwing	37	37	0	0	37	0	improved agricultural grassland and hedgerows; flew south over viewshed, coming from behind vp. lost against low cloud.	PC
L011	VP3	05/11/2020	11:19	Lapwing	12	22	0	0	22	0	improved agricultural grassland and hedgerows; picked up this flock when scanning in front of vp. heading west over viewshed. lost against clouds.	PC
L012	VP1	02/12/2020	14:01	Lapwing	100	125	0	0	125	0	improved agricultural grassland; travelled across viewshed, south to north. count is approximate., not sure if they were on the ground in the viewshed as spotted them in the air.	PC
L013	VP3	07/01/2021	11:25	Lapwing	13	116	0	16	100	0	improved agricultural grassland; travelling; flew down behind treeline, possibly landed in field	PM
L014	VP1	21/01/2021	09:43	Lapwing	18	73	0	73	0	0	improved agricultural grassland and wet grassland; travelling	PM
L015	VP1	21/01/2021	13:00	Lapwing	80	20	0	0	20	0	wet grassland; circling before dropping into field	PM
L016	VP1	21/01/2021	13:20	Lapwing	79	183	0	0	183	0	improved agricultural grassland and wet grassland; travelling/circling	PM
L017	VP1	21/01/2021	13:44	Lapwing	80	128	0	0	128	0	improved agricultural grassland and wet grassland; travelling	PM

Table 7 - 4 - 9 Lapwing Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
L001	16/12/2019	13:21	Lapwing	24	wet grassland; feeding in field (wintering)	PM
L002	08/01/2021	12:40	Lapwing	6	improved agricultural grassland; foraging (wintering)	KOC

Table 7 - 4 - 10 Lapwing Breeding Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
L001	17/05/2020		Lapwing	1	grassland and marsh; heard call but not seen, heard but not seen (suitable nesting habitat; possible breeder)	NG
L002	06/06/2020		Lapwing	20	improved agricultural grassland; flew into field, foraging, 8 flew away (suitable nesting habitat; possible breeder)	NG
L003	31/07/2020	08:57	Lapwing	18	improved agricultural grassland; roosting in long grass, flushed by observer, resettled at other end of field (suitable nesting habitat; possible breeder)	PM

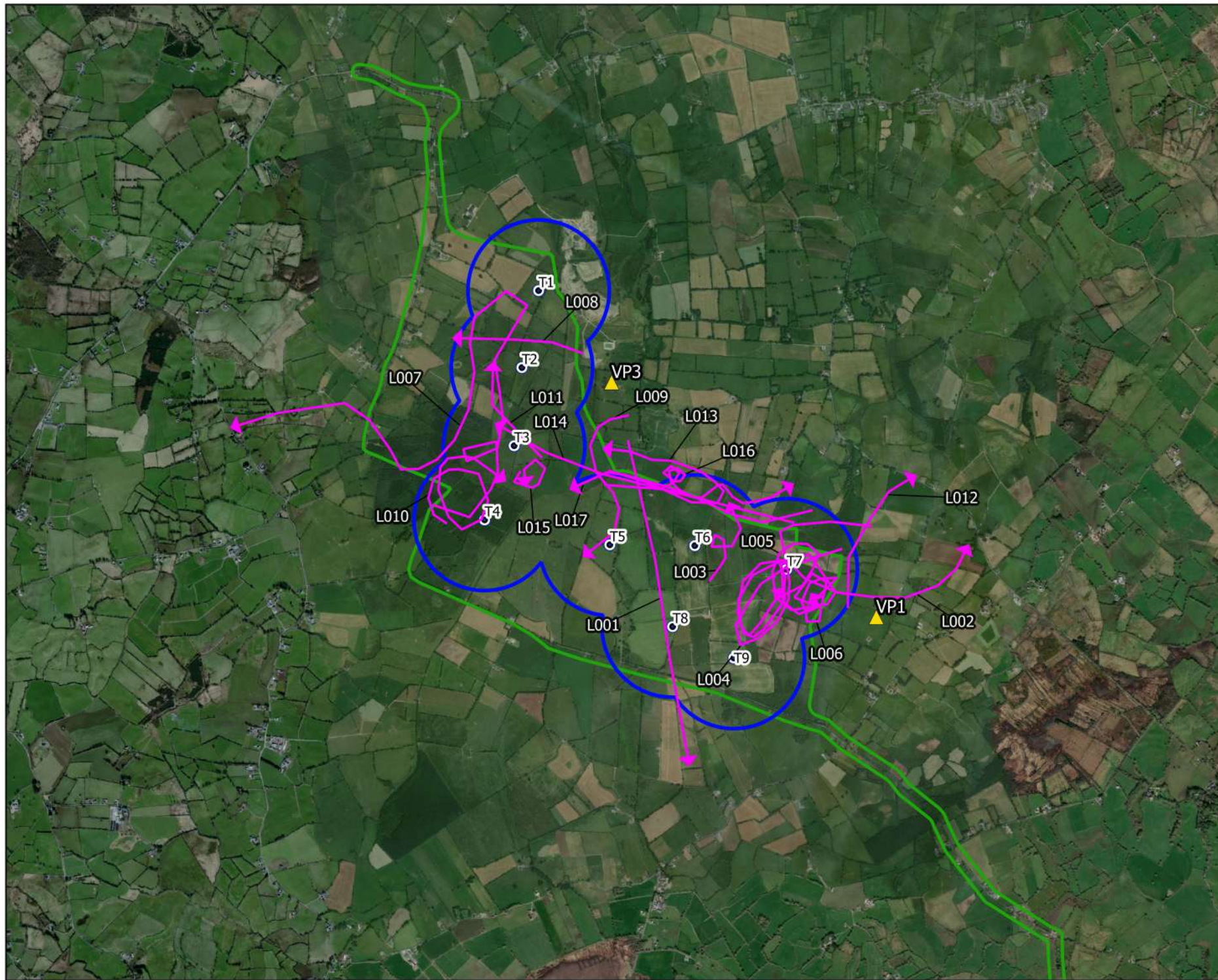
Table 7 - 4 - 11 Lapwing Waterbird Distribution Survey

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
L001	Lough Sewdy	05/10/2020	09:00	Lapwing	1	improved agricultural grassland; flying over fields north east of lake. marked as l001 on the map.	PC

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
L002	Lough Sewdy	19/11/2020	10:00	Lapwing	2	limestone/marl lakes and non-calcareous springs; flew over lake from north west to south east.	PC
L003	Lough Sewdy	19/11/2020	10:30	Lapwing	1	improved agricultural grassland; flew out of fields behind car park, circled then headed north east	PC
L004	Lough Sewdy	28/01/2021	11:56	Lapwing	23	improved agricultural grassland and eutrophic lakes; flying flock	KOC
L005	Lough Sewdy	01/02/2021	10:32	Lapwing	67	lakes and ponds and improved grassland; circling over lake, presumably looking for somewhere to land., circled for over 10 minutes so i moved from the car park, in case i was stopping them from landing.	PC

Table 7 - 4 - 12 Lapwing Incidental Records

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
L001	Vantage Point Survey; VP1	15/02/2021	10:35	Lapwing	100	improved grassland; in flight in the distance. lost behind treeline., couldn't count accurately, too far away. 100 is best estimate.	PDC



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ VP Locations
- Flight Observation



Drawing Title:
**Lapwing Vantage Point Survey
Observations**

Project Title:
**Umma More Renewable Energy
Development**

Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4-8
Scale	Date
1:35000	31.01.23

MKO
Planning and
Environmental
Consultants
Tuan Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIAR Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title:
Lapwing Winter Walkover Survey Observations

Project Title:
Umma More Renewable Energy Development

Drawn By:
D. Woods

Checked By:
P. Cregg

Project No.:
201050

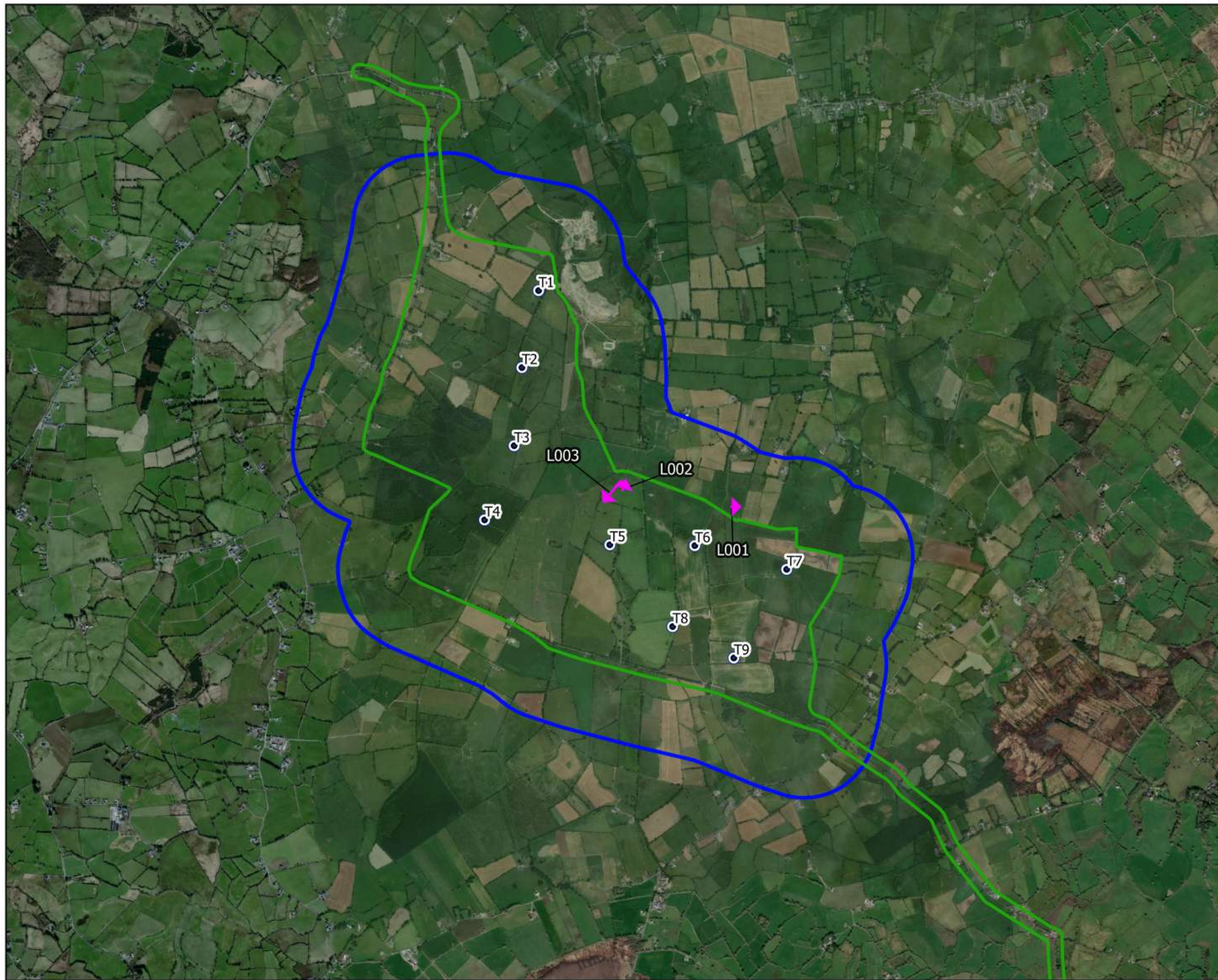
Drawing No.:
Fig. 7-4-9

Scale:
1:35000

Date:
31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIAR Site Boundary
- Turbine Layout
- 500m Survey Radius
- ➔ Flight Observation



Drawing Title

**Lapwing Breeding Walkover
Survey Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-10

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIAR Site Boundary
-  Turbine Layout
-  5km Survey Radius
-  Observation



Drawing Title:
**Lapwing Waterbird Distribution
Survey Observations**

Project Title:
Umma More Renewable Energy
Development

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-11
Scale: 1:75000	Date: 31.01.23

 **MKO**
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIAR Site Boundary
-  Turbine Layout
-  Flight Observation



Drawing Title	
Lapwing Incidental Observations	
Project Title	
Umma More Renewable Energy Development	
Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4-12
Scale	Date
1:50000	31.01.23
 MKO Planning and Environmental Consultants Tuam Road, Galway Ireland, H91 YW84 +353 (0)91 235611 email: info@mkofireland.ie Website: www.mkofireland.ie	

5.

TUFTED DUCK

Table 7 - 4 - 13 Tufted Duck Waterbird Distribution Surveys

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
TU001	5km Radius	25/02/2020	10:50	Tufted Duck	2	lakes and ponds; feeding	PM
TU002	Lough Sewdy	25/02/2021	10:36	Tufted Duck	2	lakes and ponds; diving at back of lake	PC
TU003	Lough Sewdy	22/03/2021	09:30	Tufted Duck	2	lakes and ponds; pair on water, male and female	PDC



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  5km Survey Radius
-  Observation



Drawing Title: Tufted Duck Waterbird Distribution Survey Observations	
Project Title: Umma More Renewable Energy Development	
Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-13
Scale: 1:75000	Date: 31.01.23
 MKO Planning and Environmental Consultants Tuam Road, Galway Ireland, H91 YW84 +353 (0)91 235611 email:info@mkofireland.ie Website: www.mkofireland.ie	

6.

BLACK-HEADED GULL

Table 7 - 4 - 14 Black-headed Gull Vantage Point Survey

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BH001	VP3	24/06/2019	13:57	Black-headed Gull	28	350	0	0	200	150	improved agricultural grassland; soaring	JC
BH002	VP3	24/06/2019	16:24	Black-headed Gull	19	100	0	20	80	0	improved agricultural grassland and treelines; circling	JC
BH003	VP3	24/06/2019	16:43	Black-headed Gull	210	300	0	0	200	100	improved agricultural grassland; circling	JC
BH004	VP1	27/06/2019	13:42	Black-headed Gull	2	95	15	40	40	0	improved agricultural grassland and hedgerows; flying	JC
BH005	VP3	31/08/2019	20:11	Black-headed Gull	21	40	10	0	30	0		JC
BH006	VP3	17/01/2020	10:17	Black-headed Gull	75	1145	0	500	0	0	improved agricultural grassland; circling; still circling at end of survey	PM
BH007	VP3	17/01/2020	11:41	Black-headed Gull	77	894	0	400	0	0	improved agricultural grassland; circling	PM
BH008	VP3	17/01/2020	12:29	Black-headed Gull	75	227	0	0	227	0	improved agricultural grassland; circling before landing in field	PM
BH009	VP3	17/01/2020	12:47	Black-headed Gull	75	278	0	78	200	0	improved agricultural grassland; circling before landing in field	PM
BH010	VP3	17/01/2020	12:59	Black-headed Gull	75	501	0	300	201	0	improved agricultural grassland; circling then landed in field	PM
BH011	VP1	16/04/2020	15:45	Black-headed Gull	2	120	0	120	0	0	wet grassland; travelling through	TR
BH012	VP3	29/06/2020	06:37	Black-headed Gull	1	41	0	41	0	0	improved agricultural grassland and active quarries and mines; appeared to come from same area as bz003. travelled over vp heading nw.	PC

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BH013	VP3	29/06/2020	07:05	Black-headed Gull	1	8	8	0	0	0	improved agricultural grassland and active quarries and mines; came from in front of vp, not sure exactly where. travelled over vp and off nw.	PC
BH014	VP3	29/06/2020	07:22	Black-headed Gull	3	8	0	8	0	0	improved agricultural grassland; spotted these three flying towards vp after watching ma007. flight timing is approximate.	PC
BH015	VP3	29/06/2020	07:38	Black-headed Gull	27	32	0	32	0	0	improved agricultural grassland; travelling across viewshed from south to north.	PC
BH016	VP3	29/06/2020	08:00	Black-headed Gull	1	28	8	20	0	0	improved agricultural grassland; travelled from behind vp in a semi-circle in front of vp then off behind vp again.	PC
BH017	VP3	29/06/2020	08:35	Black-headed Gull	26	260	260	0	0	0	improved agricultural grassland; flock feeding in fields, rising and settling constantly and flying from one field to another then back again. i think this flock then flew over vp at 8:45 whilst on my break, with another 10 birds coming from behind the vp to join them.	PC
BH018	VP3	29/06/2020	09:38	Black-headed Gull	2	119	9	110	0	0	improved agricultural grassland; travelled across viewshed, lost against background.	PC
BH019	VP3	29/06/2020	11:25	Black-headed Gull	5	42	0	42	0	0	improved agricultural grassland and conifer plantation; travelled across viewshed from south to north.	PC
BH020	VP3	08/07/2020	10:33	Black-headed Gull	1	67	0	67	0	0	improved agricultural grassland; one bird with lb010, following them north to south.	PC
BH021	VP3	07/01/2021	11:50	Black-headed Gull	1	98	0	0	98	0	improved agricultural grassland; travelling	PM

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BH022	VP3	16/02/2021	10:06	Black-headed Gull	2	82	0	0	82	0	improved grassland; flew across viewshed east to west. lost against clouds in distance.	PDC

Table 7 - 4 - 15 Black-headed Gull Breeding Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
BH001	06/06/2020	09:00	Black-headed Gull	1	tilled land; flew into field, foraging (summering; non-breeding)	NG

Table 7 - 4 - 16 Black-headed Gull Waterbird Distribution Survey

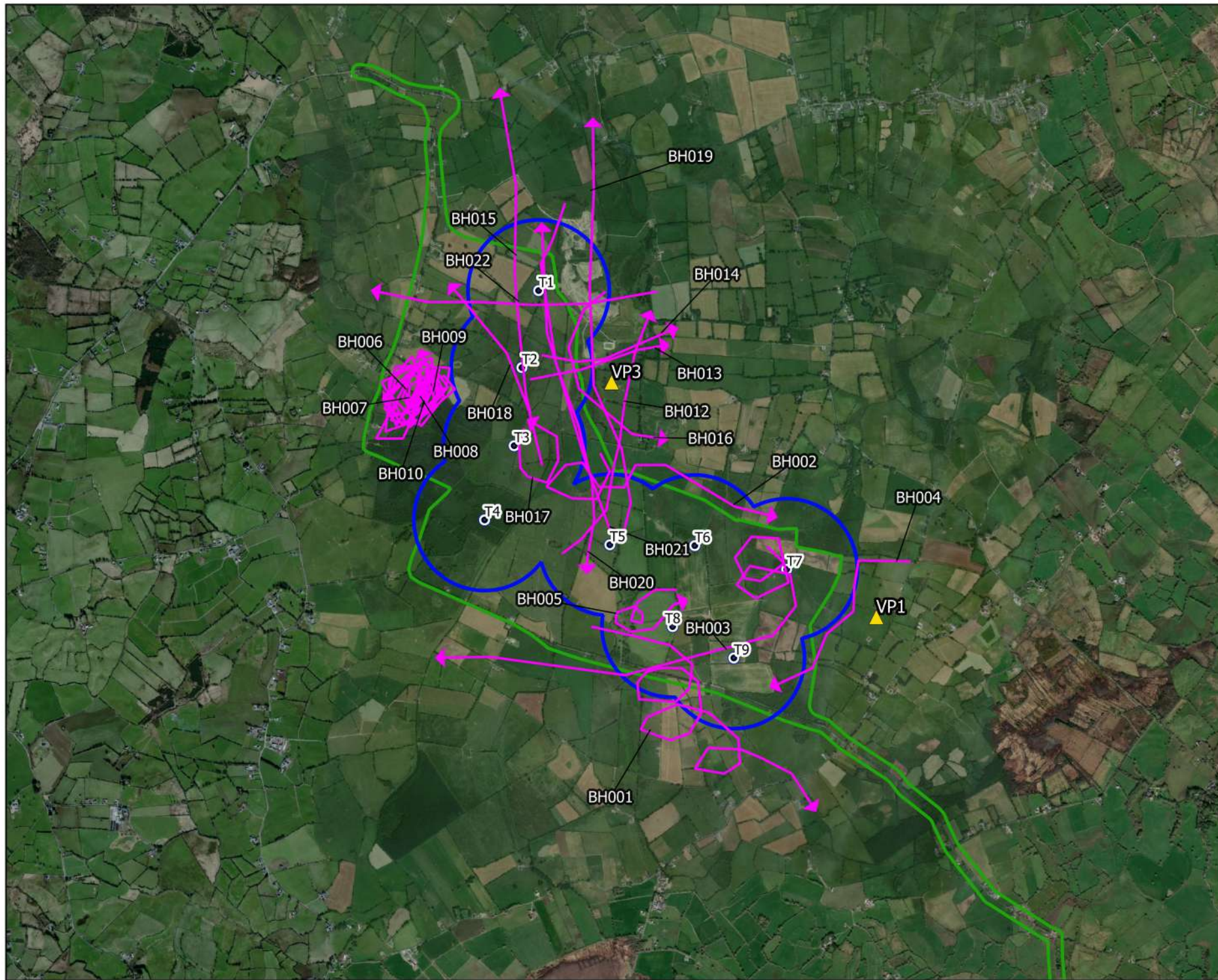
Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
BH001	Lough Sewdy	01/02/2021	10:25	Black-headed Gull	14	lakes and ponds; flying over lake heading south west	PC

Table 7 - 4 - 17 Black-headed Gull Incidental Records

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
BH001	Breeding Raptor Survey; RVP4	26/06/2020	08:45	Black-Headed Gull	1	improved agricultural grassland; travelling	JK

Table 7 - 4 - 18 Black-headed Gull Supplementary Data

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BH001	VP4a	25/06/2019	10:54	Black-headed Gull	4	180	0	0	100	80	improved agricultural grassland, treelines and buildings and artificial surfaces; flying, soaring	JC
BH002	VP2	26/06/2019	10:47	Black-headed Gull	8	40	0	10	30	0	improved agricultural grassland and treelines; circling	JC



Map Legend

- EIAR Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ VP Locations
- Flight Observation



Drawing Title:
**Black-headed Gull Vantage Point
Survey Observations**

Project Title:
Umma More Renewable Energy
Development

Drawn By:
D. Woods

Checked By:
P. Cregg

Project No.:
201050

Drawing No.:
Fig. 7-4-14

Scale:
1:35000

Date:
31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- ➔ Flight Observation



Drawing Title

**Black-headed Gull Breeding
Walkover Survey Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-15

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  5km Survey Radius
-  Observation



Drawing Title:
**Black-headed Gull Waterbird
Distribution Survey Observations**

Project Title:
**Umma More Renewable Energy
Development**

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-16
Scale: 1:75000	Date: 31.01.23

 **MKO**
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie

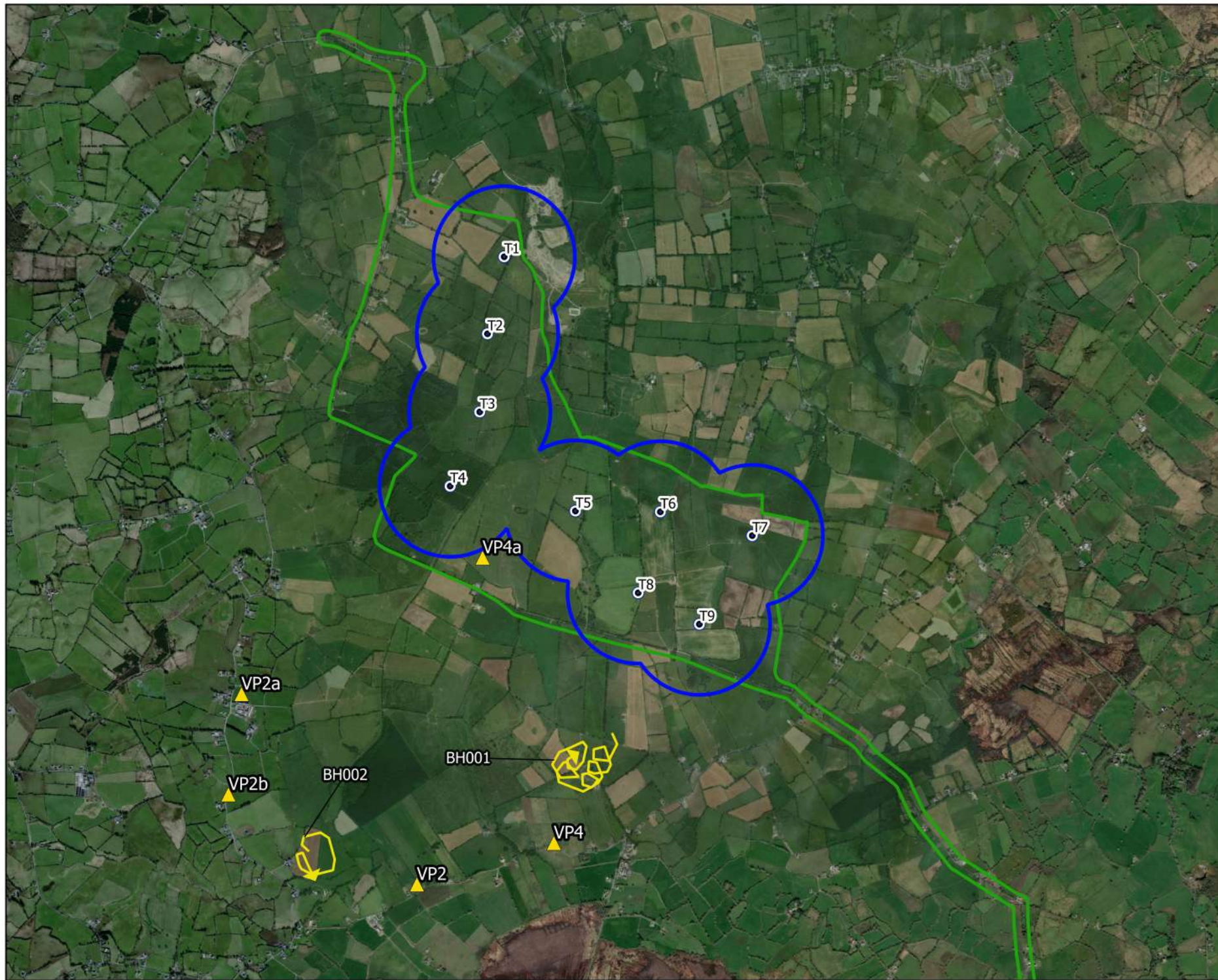


Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  Flight Observation



Drawing Title: Black-headed Gull Incidental Records	
Project Title: Umma More Renewable Energy Development	
Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-17
Scale: 1:50000	Date: 31.01.23
 MKO Planning and Environmental Consultants Tuam Road, Galway Ireland, H91 YV84 +353 (0)91 235611 email: info@mkofireland.ie Website: www.mkofireland.ie	



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- Flight Observation



Drawing Title	
Black-headed Gull Supplementary Data	
Project Title	
Umma More Renewable Energy Development	
Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4-18
Scale	Date
1:35000	09.02.23

MKO
Planning and
Environmental
Consultants

Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkoireland.ie
Website: www.mkoireland.ie

7.

LITTLE GREBE

Table 7 - 4 - 19 Little Grebe Waterbird Distribution Surveys

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
LG001	Lough Sewdy	22/11/2019	10:33	Little Grebe	1	lakes and ponds; calling from reeds	PM
n/a	Lough Sewdy	25/02/2020	10:49	Little Grebe	1	lakes and ponds; calling, heard. not mapped	PM
LG002	Lough Sewdy	10/03/2020	14:00	Little Grebe	1	lakes and ponds; feeding/roosting	ED
LG003	Lough Sewdy	12/05/2020	09:55	Little Grebe	1	lakes and ponds; calling	PM
LG004	Lough Sewdy	12/05/2020	09:56	Little Grebe	1	lakes and ponds; calling	PM
LG005	Lough Sewdy	14/01/2021	15:14	Little Grebe	1	eutrophic lakes; diving, not sure if lg or some other small diving bird, seen once	KOC



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  5km Survey Radius
-  Observation



Drawing Title:
**Little Grebe Waterbird Distribution
Survey Observations**

Project Title:
**Umma More Renewable Energy
Development**

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-19
Scale: 1:75000	Date: 31.01.23

 **MKO**
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0) 91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie

8.

MALLARD

Table 7 - 4 - 20 Mallard Vantage Point Survey

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
MA001	VP3	17/07/2019	13:09	Mallard	1	60	0	0	60	0	improved agricultural grassland and hedgerows; flying northeast before lost behind trees.	PW
MA002	VP1	16/04/2020	17:07	Mallard	2	70	0	0	70	0	arable crops; travelling and landing on site	TR
MA003	VP1	16/04/2020	19:15	Mallard	1	40	0	0	40	0	wet grassland and arable crops; travelling male	TR
MA004	VP1	16/04/2020	20:00	Mallard	1	10	10	0	0	0	wet grassland and improved agricultural grassland; travelling low	TR
MA005	VP3	17/04/2020	17:15	Mallard	3	70	0	0	70	0	conifer plantation and wet grassland; chasing, breeding area	TR
MA006	VP3	17/04/2020	17:45	Mallard	5	40	40	0	0	0	disturbed ground; chasing, breeding nearby	TR
MA007	VP3	29/06/2020	07:20	Mallard	4	32	0	32	0	0	improved agricultural grassland; came from behind vp at same time as bz006 came up. travelled over viewshed disappearing to south.	PC
MA008	VP3	29/06/2020	08:12	Mallard	4	32	5	27	0	0	improved agricultural grassland; travelled across viewshed from behind vp. lost against background of trees.	PC
MA009	VP3	08/07/2020	06:05	Mallard	1	37	0	37	0	0	improved agricultural grassland; spotted flying east from in front of vp. travelled across viewshed, direct flight.	PC
MA010	VP3	08/07/2020	06:10	Mallard	1	42	42	0	0	0	improved agricultural grassland and conifer plantation; picked up flying low over viewshed, heading south. hard to	PC

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
											track against plantations, visibility not great looking down.	
MA011	VP3	08/07/2020	06:50	Mallard	1	5	5	0	0	0	improved agricultural grassland; seemed to come up from field in front of vp. headed east behind vp.	PC
MA012	VP1	25/08/2020	16:56	Mallard	6	20	0	20	0	0	improved agricultural grassland; travelling	PM
MA013	VP3	26/08/2020	20:22	Mallard	2	50	0	0	50	0	improved agricultural grassland; travelling; 2 drakes	PM
MA014	VP3	05/11/2020	08:55	Mallard	2	16	16	0	0	0	improved agricultural grassland, hedgerows and watercourses; flew from behind vp to north low over viewshed and settled on river, as far as i could tell.	PC
MA015	VP3	23/03/2021	08:42	Mallard	2	39	0	39	0	0	watercourses, improved grassland and active quarries and mines; flying low across viewshed following river s to n. lost near quarry.	PDC

Table 7 - 4 - 21 Mallard Vantage Point Survey (non-flights)

Map Ref.	VP	Date	Time	Species	Number	Habitat and activity	Surveyor
n/a	VP3	24/10/2019	18:49	Mallard	1	improved agricultural grassland; heard only, heard from fields to south of vp. not mapped.	PM
MA016	VP3	13/02/2020	18:10	Mallard	1	depositing/lowland rivers and wet grassland; heard calling from river	PM

Table 7 - 4 - 22 Mallard Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
MA001	22/01/2020	09:34	Mallard	2	depositing/lowland rivers and wet grassland; flushed off river (wintering)	PM
MA002	27/10/2020	09:45	Mallard	3	improved agricultural grassland and hedgerows; in flight, came off site and flew over road heading west, in flight, came off site and flew over road heading west (wintering)	PC
MA003	24/03/2021	10:15	Mallard	2	watercourses and improved grassland; spotted in flight (wintering)	PDC

Table 7 - 4 - 23 Mallard Breeding Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
n/a	30/05/2019	13:18	Mallard	1	watercourses; flying, not mapped (suitable nesting habitat; possible breeder)	JC
MA001	17/05/2020	-	Mallard	2	grassland and marsh; flying over (flyover; non-breeding)	NG
MA002	24/05/2020	-	Mallard	11	grassland and marsh and watercourses; adult with 10 ducklings swimming in river, swam for cover (fledged young; confirmed breeding)	NG

Table 7 - 4 - 24 Mallard Waterbird Distribution Survey

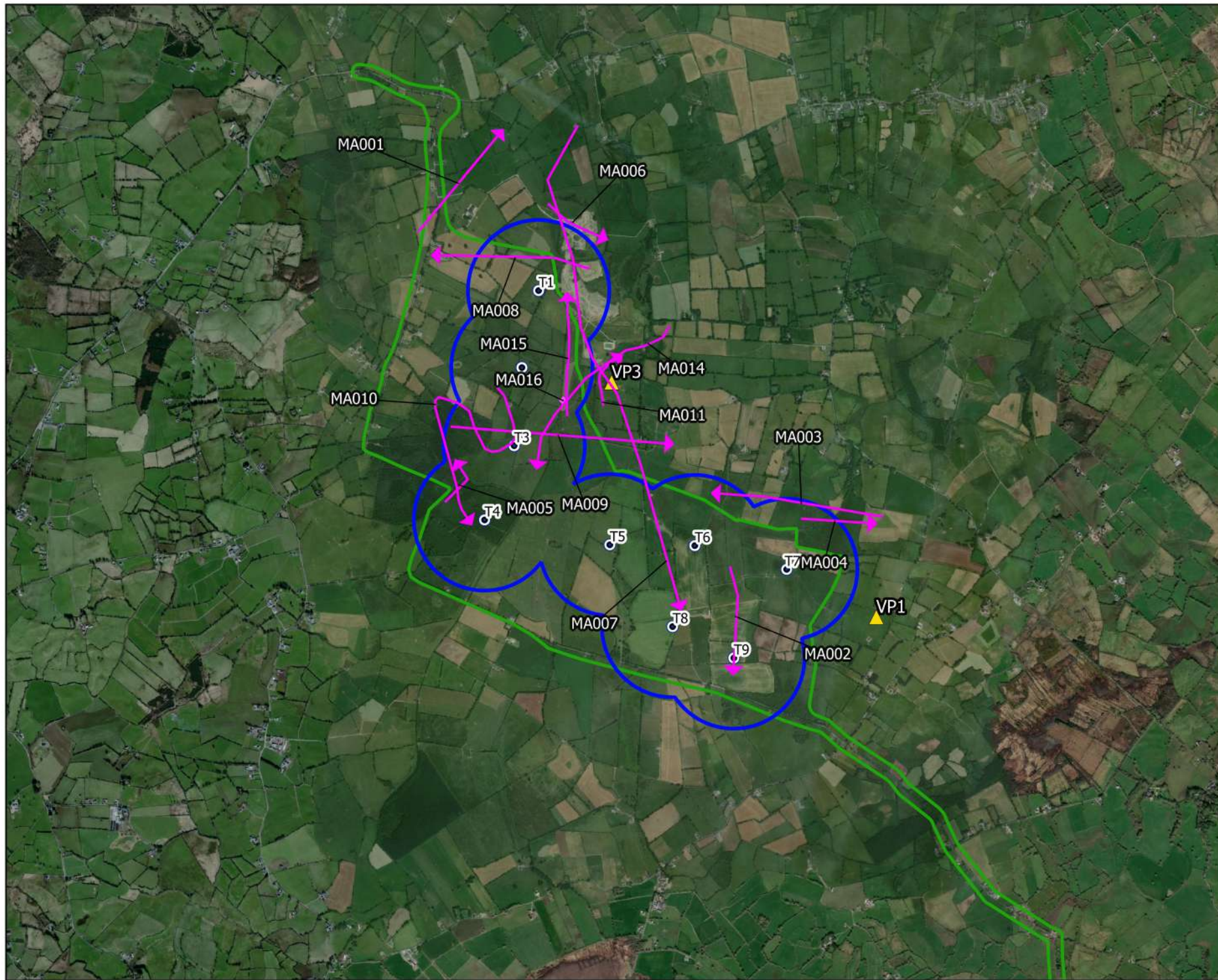
Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
MA001	Lough Sewdy	16/09/2019	10:22	Mallard	8	lakes and ponds; on water, north section quiet see map	JK

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
MA002	Lough Sewdy	08/11/2019	09:54	Mallard	2	lakes and ponds; on water	PM
MA003	Lough Sewdy	10/02/2020	08:08	Mallard	3	lakes and ponds; flew from lake	PM
MA004	Lough Sewdy	25/02/2020	10:50	Mallard	9	lakes and ponds; feeding	PM
MA005	Moyvoughly Bog	25/02/2020	12:20	Mallard	2	raised bog; flying	PM
MA006	Lough Sewdy	10/03/2020	14:00	Mallard	2	lakes and ponds; feeding/roosting, flying over site at 20m high	ED
MA007	Lough Sewdy	24/03/2020	14:00	Mallard	4	lakes and ponds; feeding/roosting	ED
MA008	Pond near Calliaghstown	24/03/2020	15:00	Mallard	2	turloughs; feeding/roosting	ED
MA009	Moyvoughly Bog	12/05/2020	11:27	Mallard	3	raised bog; travelling, 3 drakes	PM
MA010	Lough Sewdy	17/09/2020	07:30	Mallard	1	lakes and ponds and reed and large sedge swamps; male flew in over reeds and landed on lake out of sight	PC
MA011	Lough Sewdy	23/10/2020	09:30	Mallard	2	lakes and ponds; feeding on water at back of lough. marked as ma002 on map.	PC
MA012	Lough Sewdy	19/11/2020	09:34	Mallard	4	limestone/marl lakes and non-calcareous springs; at least 4 calling from behind reedbeds; not visible	PC
MA013	Lough Sewdy	19/11/2020	10:22	Mallard	4	limestone/marl lakes; two males and two females feeding in pairs on far side of lake	PC
MA014	Lough Sewdy	09/12/2020	10:21	Mallard	2	lakes and ponds; flew across lake, landing out of site behind reeds	PC
MA015	Lough Sewdy	18/12/2020	10:15	Mallard	1	reed and large sedge swamps and lakes and ponds; heard calling but not visible, presumably on bank behind reeds	PC

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
MA016	Lough Sewdy	14/01/2021	15:06	Mallard	3	eutrophic lakes; swimming	KOC
MA017	Ballinderry Bog	28/01/2021	10:16	Mallard	12	cutover bog and improved agricultural grassland; flying, ducks, most likely ma	KOC
MA018	Dungolman river, Lecade	28/01/2021	12:59	Mallard	6	improved agricultural grassland; swimming , swimming in a flooded field close to the river	KOC
MA019	Lough Sewdy	01/02/2021	10:27	Mallard	5	lakes and ponds; on water of lake	PC
MA020	Lough Sewdy	25/02/2021	10:40	Mallard	1	lakes and ponds; in flight over lake and island	PC
MA021	Lough Sewdy	10/03/2021	09:15	Mallard	3	lakes and ponds; flew over then landed on lake	PDC
MA022	Lough Sewdy	22/03/2021	09:32	Mallard	4	lakes and ponds; flew in and settled on lake	PDC
MA023	Lough Sewdy	22/03/2021	09:55	Mallard	2	lakes and ponds; flew in from behind island and settled on lake	PDC

Table 7 - 4 - 25 Mallard Incidental Records

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
n/a	Vantage Point Survey; VP3	05/11/2020		Mallard	1	improved agricultural grassland; female heard calling, sounded like it was in front of vp but couldn't see it., not mapped	PC
MA001	Breeding Raptor Survey; RVP2	20/04/2019		Mallard	3	cutover bog; flying away	JC



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ VP Locations
- Flight Observation
- ◆ Non-Flight Observation



Drawing Title

**Mallard Vantage Point Survey
Observations**

Project Title

**Umma More Renewable Energy
Development**

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-20

Scale

1:35000

Date

09.02.23



MKO
Planning and
Environmental
Consultants
Tuan Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title:
**Mallard Winter Walkover Survey
Observations**

Project Title:
**Umma More Renewable Energy
Development**

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-21
Scale: 1:35000	Date: 31.01.23

MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title:
Mallard Breeding Walkover Survey Observations

Project Title:
Umma More Renewable Energy Development

Drawn By:
D. Woods

Checked By:
P. Cregg

Project No.:
201050

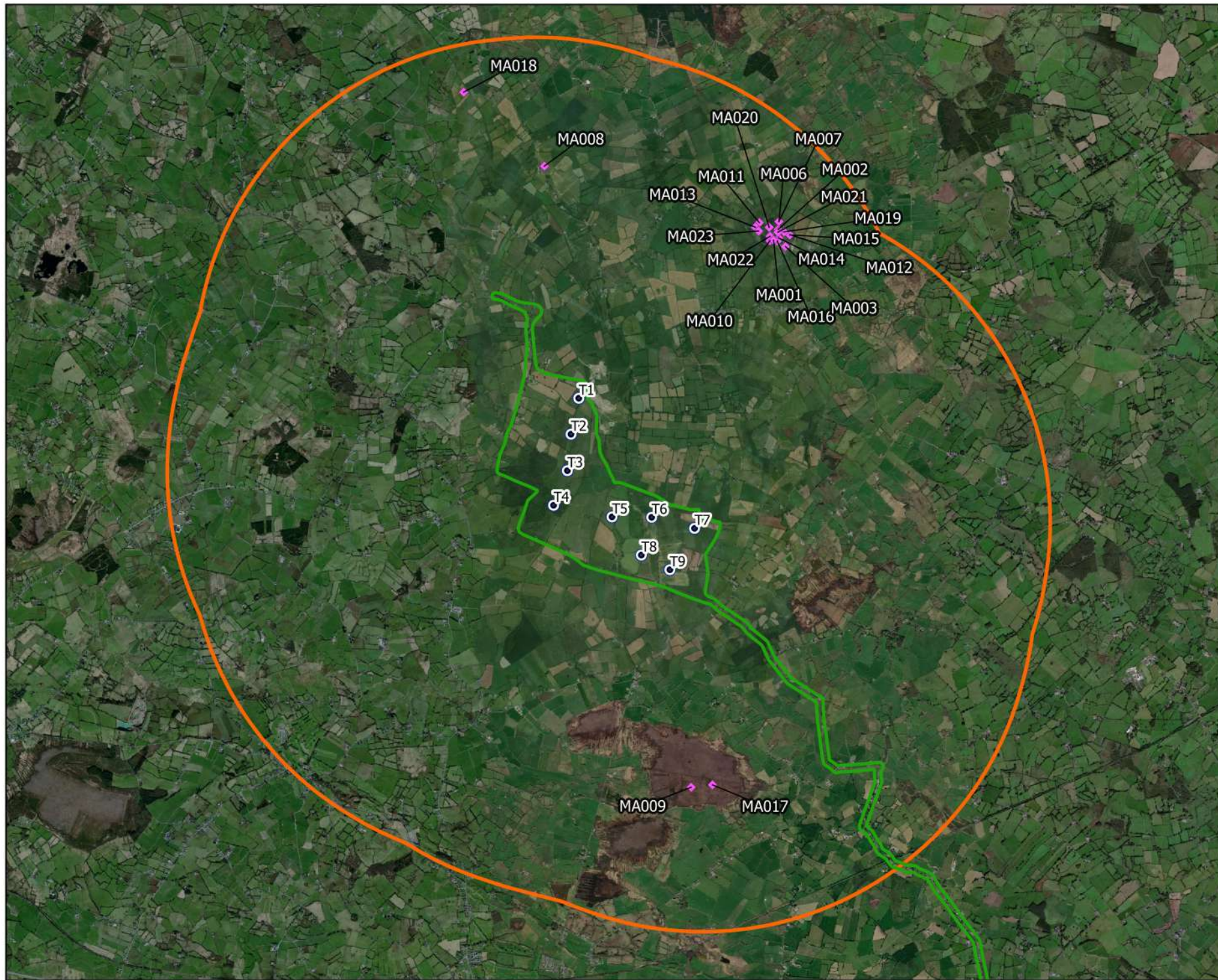
Drawing No.:
Fig. 7-4-22

Scale:
1:35000

Date:
31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 5km Survey Radius
- Observation



Drawing Title:
Mallard Waterbird Distribution
Survey Observations

Project Title:
Umma More Renewable Energy
Development

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-23
Scale: 1:75000	Date: 31.01.23

MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0) 91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  Flight Observation



Drawing Title	
Mallard Incidental Records	
Project Title	
Umma More Renewable Energy Development	
Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4-24
Scale	Date
1:50000	31.01.23
 MKO Planning and Environmental Consultants Tuam Road, Galway Ireland, H91 YW84 +353 (0)91 235611 email: info@mkofireland.ie Website: www.mkofireland.ie	

9.

TEAL

Table 7 - 4 - 26 Teal Vantage Point Survey

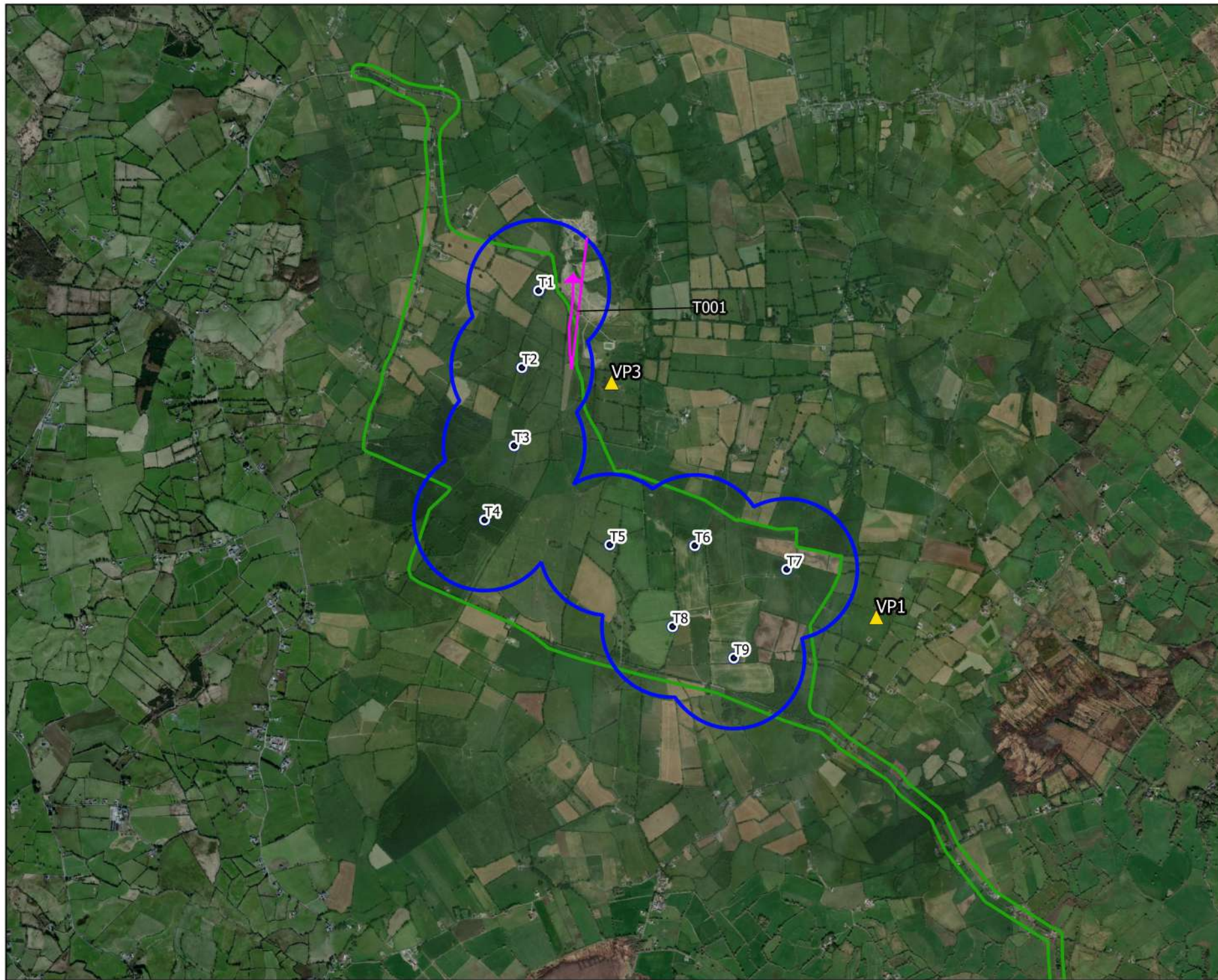
Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
T001	VP3	23/03/2021	09:11	Teal	4	16	0	0	16	0	watercourses, improved grassland and active quarries and mines; flew across viewshed heading north. not sure where they came from. lost over quarry.	PDC

Table 7 - 4 - 27 Teal Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
T001	16/12/2019	09:52	Teal	2	wet grassland; flushed from river (wintering)	PM
T002	22/01/2020	14:30	Teal	7	depositing/lowland rivers and wet grassland; flushed (wintering)	PM
T003	08/01/2021	16:01	Teal	8	depositing/lowland rivers; flew away, flushed from a river (wintering)	KOC
T004	08/01/2021	16:14	Teal	3	depositing/lowland rivers; flew away, flushed (wintering)	KOC

Table 7 - 4 - 28 Teal Waterbird Distribution Survey

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
T001	Lough Sewdy	09/12/2020	10:45	Teal	1	lakes and ponds and non-calcareous springs; flew across lake and settled in reeds, near where ma settled	PC
T002	Pond near Calliaghstown	14/01/2021	14:04	Teal	32	eutrophic lakes; swimming	KOC
T003	Lough Sewdy	14/01/2021	15:36	Teal	1	reed and large sedge swamps; calling, calling in reeds	KOC
T004	Raheen	22/03/2021	10:29	Teal	5	improved grassland; feeding on floodwater in field at side of moyvoughly road	PDC



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- VP Locations
- Flight Observation



Drawing Title

**Teal Vantage Point Survey
Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-25

Scale

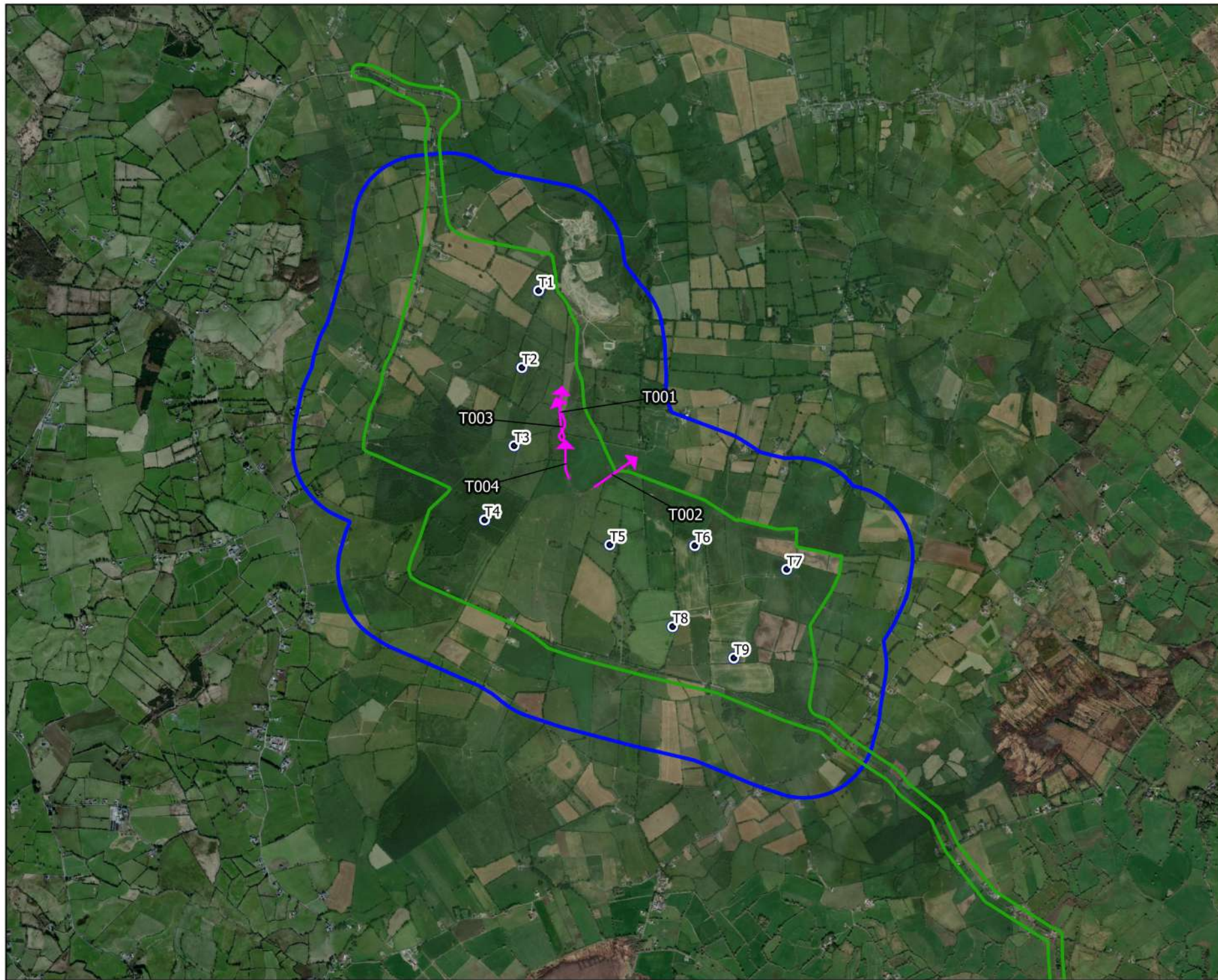
1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title

Teal Winter Walkover Survey Observations

Project Title

Umma More Renewable Energy Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-26

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  5km Survey Radius
-  Observation



Drawing Title:
Teal Waterbird Distribution Survey Observations

Project Title:
Umma More Renewable Energy Development

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-27
Scale: 1:75000	Date: 31.01.23

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie

Microsoft product screen shots reprinted with permission from Microsoft Corporation

10.

SNIPE

Table 7 - 4 - 29 Snipe Vantage Point Survey

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
SN001	VP1	16/10/2019	19:15	Snipe	1	10	0	0	0	0	improved agricultural grassland; calling/travelling	PM
SN002	VP3	24/10/2019	18:54	Snipe	1	10	10	0	0	0	improved agricultural grassland; travelling; calling	PM
SN003	VP1	13/11/2019	07:18	Snipe	1	20	20	0	0	0	improved agricultural grassland; flew from field	PM
SN004	VP1	10/12/2019	11:02	Snipe	1	99	9	10	80	0	improved agricultural grassland; flew from field	PM
SN005	VP1	10/12/2019	11:03	Snipe	1	15	0	0	0	0	improved agricultural grassland; flushed by observer	PM
SN006	VP1	10/12/2019	11:26	Snipe	1	46	0	0	46	0	improved agricultural grassland; travelling high	PM
SN007	VP1	10/12/2019	17:02	Snipe	1	5	5	0	0	0	improved agricultural grassland; travelling low	PM
SN008	VP1	10/12/2019	17:03	Snipe	3	10	0	10	0	0	improved agricultural grassland; travelling	PM
SN009	VP1	10/12/2019	17:07	Snipe	1	5	0	0	0	0	improved agricultural grassland; travelling	PM
SN010	VP3	07/01/2021	13:04	Snipe	1	125	0	125	0	0	improved agricultural grassland; circling	PM
SN011	VP3	07/01/2021	13:36	Snipe	1	173	0	0	173	0	improved agricultural grassland; travelling	PM

Table 7 - 4 - 30 Snipe Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
SN001	25/10/2019	10:19	Snipe	3	wet grassland; flushed (wintering)	PM
SN002	25/10/2019	11:53	Snipe	1	wet grassland; flushed (wintering)	PM
SN003	25/10/2019	13:36	Snipe	2	wet grassland; flushed (wintering)	PM
SN004	25/10/2019	13:39	Snipe	2	wet grassland; flushed (wintering)	PM
SN005	16/12/2019	11:49	Snipe	8	wet grassland; flushed (wintering)	PM
SN006	16/12/2019	12:39	Snipe	3	wet grassland; flushed (wintering)	PM
SN007	16/12/2019	13:21	Snipe	1	wet grassland; flushed (wintering)	PM
SN008	22/01/2020	13:01	Snipe	1	wet grassland; flushed (wintering)	PM
SN009	22/01/2020	13:04	Snipe	2	wet grassland; flushed (wintering)	PM
SN010	22/01/2020	13:14	Snipe	7	wet grassland; flushed (wintering)	PM
SN011	08/01/2021	13:01	Snipe	1	improved agricultural grassland and hedgerows; flew away, flushed (wintering)	KOC
SN012	08/01/2021	13:06	Snipe	1	improved agricultural grassland; flew away, flushed (wintering)	KOC
SN013	08/01/2021	13:07	Snipe	1	improved agricultural grassland; flying calling (wintering)	KOC
SN014	08/01/2021	13:51	Snipe	1	improved agricultural grassland; flew away, flushed (wintering)	KOC

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
SN015	08/01/2021	14:03	Snipe	2	improved agricultural grassland; flew away to another field, flushed (wintering)	KOC
SN016	08/01/2021	14:06	Snipe	1	improved agricultural grassland; flew away, flushed (wintering)	KOC
SN017	08/01/2021	15:35	Snipe	1	drainage ditches; flew away, flushed from a ditch (wintering)	KOC
SN018	08/01/2021	16:05	Snipe	1	depositing/lowland rivers; flew away, flushed from icy river shore (wintering)	KOC

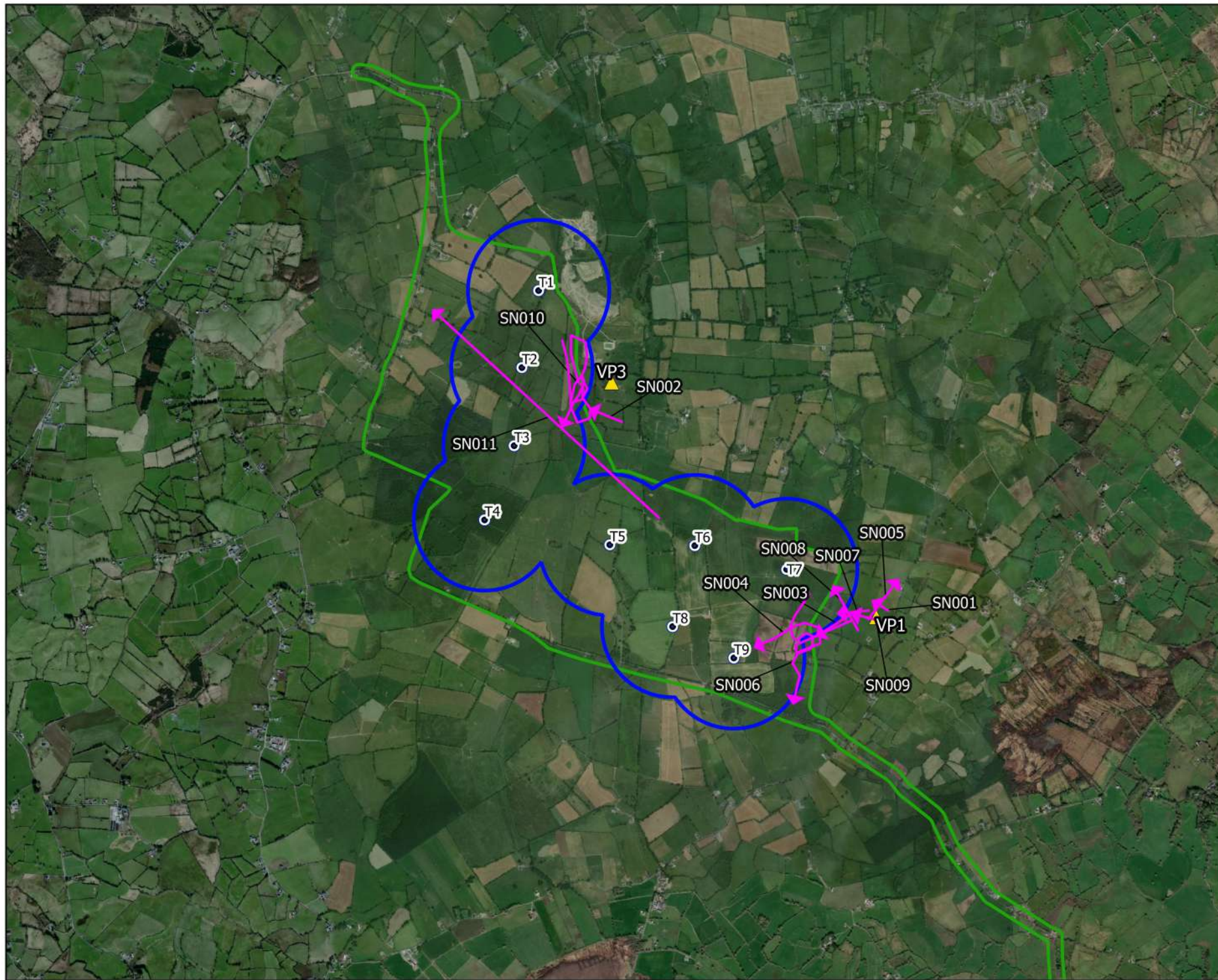
Table 7 - 4 - 31 Snipe Waterbird Distribution Survey

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN001	Lough Sewdy	12/05/2020	09:56	Snipe	1	poor fen and flush; flushed	PM
SN002	Lough Sewdy	12/05/2020	09:58	Snipe	1	poor fen and flush; drumming	PM
SN003	Lough Sewdy	17/09/2020	07:30	Snipe	1	reed and large sedge swamps; flew up from behind reeds, 30 second flight and settled in field to right of car park	PC
SN004	Kilnahinch Bog	17/09/2020	08:30	Snipe	1	bogs; flushed from bog, flew into bog and landed following very brief flight	PC
SN005	Lough Sewdy	02/11/2020	09:50	Snipe	6	limestone/marl lakes and improved agricultural grassland; flying low over the lake, south west to north east then back again, repeated a number of times. something obviously spooked them but i didn't see what. lost off to the north east.	PC
SN006	Lough Sewdy	19/11/2020	10:20	Snipe	3	non-calcareous springs; flushed from alongside footpath leading into reeds on south side of car park	PC

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN007	Lough Sewdy	18/12/2020	10:19	Snipe	30	improved grassland; flew in from south east and settled on grassland to east. lots of calling., count is approximate as flock caught me by surprise.	PC
SN008	Ballinderry Bog	14/01/2021	10:21	Snipe	1	cutover bog; flew away flushed	KOC
SN009	Ballinderry Bog	14/01/2021	10:29	Snipe	1	cutover bog; flew away flushed	KOC
SN010	Ballinderry Bog	14/01/2021	11:20	Snipe	1	cutover bog; flew away flushed	KOC
SN011	Gortnadoofa Bog	14/01/2021	12:02	Snipe	1	cutover bog; flew away flushed	KOC
SN012	Lough Sewdy	14/01/2021	15:32	Snipe	2	tall-herb swamps; flushed	KOC
SN013	Lough Sewdy	14/01/2021	15:34	Snipe	1	tall-herb swamps; flushed	KOC
SN014	Lough Sewdy	28/01/2021	11:58	Snipe	1	reed and large sedge swamps; flushed	KOC
SN015	Lough Sewdy	28/01/2021	12:08	Snipe	3	reed and large sedge swamps; flushed	KOC
SN016	Gortnadoofa Bog	28/01/2021	14:38	Snipe	1	cutover bog; flushed	KOC
SN017	Lough Sewdy	01/02/2021	10:22	Snipe	1	wet grassland; flushed from wet grassland, footpath leads out into reeds through wet grassland	PC
SN018	Moyvoughly Bog	22/03/2021	11:10	Snipe	1	bogs; flushed from side of bog road	PDC

Table 7 - 4 - 32 Snipe Incidental Records

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
n/a	Breeding Raptor Survey; RVP7	23/07/2020	08:45	Snipe	1	bogs; flushed from edge of bog, not mapped	PC
SN001	Vantage Point Survey; VP1	21/01/2021	07:33	Snipe	1	improved agricultural grassland; flushed	PM
SN002	Breeding Raptor Survey; RVP2	20/04/2019	16:49	Snipe	1	cutover bog;	JC
SN003	Breeding Raptor Survey; RVP4	26/06/2020	08:49	Snipe	1	improved agricultural grassland; chipping	JK
SN004	Breeding Raptor Survey; RVP7	26/06/2020	10:15	Snipe	1	cutover bog; drumming	JK



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- VP Locations
- Flight Observation



Drawing Title

**Snipe Vantage Point Survey
Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-28

Scale

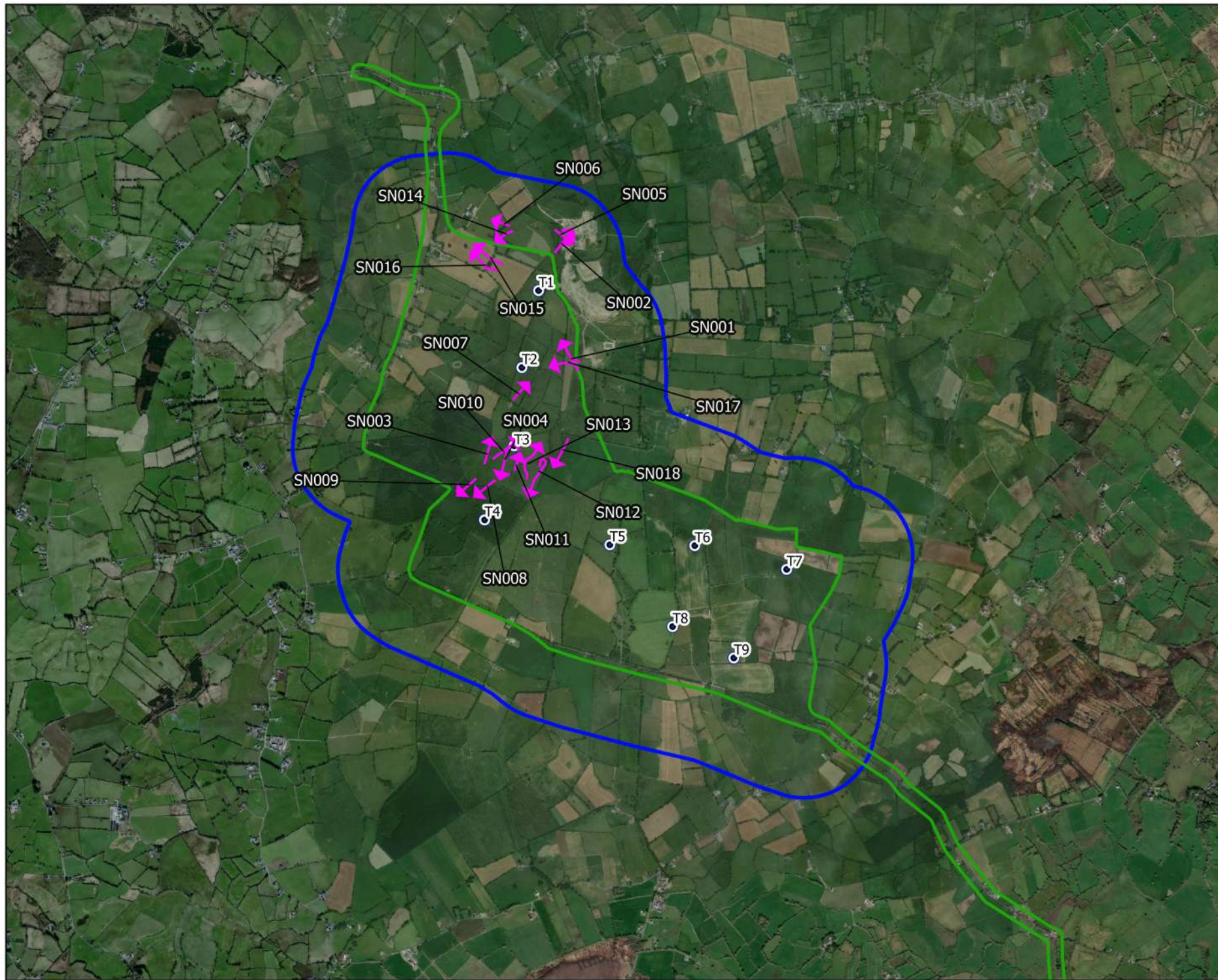
1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title

Snipe Winter Walkover Survey Observations

Project Title

Umma More Renewable Energy Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-29

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 5km Survey Radius
- Observation



Drawing Title: Snipe Waterbird Distribution Survey Observations	
Project Title: Umma More Renewable Energy Development	
Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-30
Scale: 1:75000	Date: 31.01.23
 MKO Planning and Environmental Consultants Tuam Road, Galway Ireland, H91 YW84 +353 (0)91 235611 email: info@mkoireland.ie Website: www.mkoireland.ie	



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  Flight Observation



Drawing Title

Snipe Incidental Records

Project Title

Umma More Renewable Energy Development

Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4-31
Scale	Date
1:50000	31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie

11.

KESTREL

Table 7 - 4 - 33 Kestrel Vantage Point Survey

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
K001	VP1	16/07/2019	18:40	Kestrel	2	540	0	10	530	0	improved agricultural grassland and hedgerows; flying, gliding north. these k met another unknown raptor at the hill and both k descended. then one was followed until 18:49 when it was lost.	PW
K002	VP3	17/07/2019	12:32	Kestrel	1	80	0	10	70	0	active quarries and mines; flying at first then hovering. then dropped down and flew behind a clay bank when lost from view.	PW
K003	VP3	17/07/2019	12:46	Kestrel	1	65	0	35	30	0	active quarries and mines and scrub; flying, hovering, hunting. dropped and flew behind clay bank. disappeared briefly before that too and lost behind bank.	PW
K004	VP3	17/07/2019	12:55	Kestrel	1	810	5	405	400	0	scrub and active quarries and mines; hunting by hovering over scrub gorse and grass in quarry where machinery was working. dropping down multiple times and coming back up again. it perched at 12:59:25 for 5 seconds.	PW
K005	VP3	17/07/2019	13:21	Kestrel	1	210	0	10	200	0	active quarries and mines and scrub; seen hunting and hovering. lost from view at 13:25.	PW
K006	VP3	17/07/2019	13:15	Kestrel	1	180	0	30	150	0	active quarries and mines and scrub; hovering and hunting.	PW
K007	VP3	17/07/2019	13:58	Kestrel	1	120	0	0	120	0	active quarries and mines and hedgerows; back hunting in quarry.	PW

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
K008	VP3	17/07/2019	15:40	Kestrel	1	270	0	10	260	0	active quarries and mines and scrub; hovering and hunting.	PW
K009	VP3	17/07/2019	15:55	Kestrel	1	110	0	0	110	0	active quarries and mines and scrub; hovering and flying.	PW
K010	VP3	17/07/2019	16:30	Kestrel	10	10	0	10	0	0	active quarries and mines; flying	PW
K011	VP3	17/07/2019	17:47	Kestrel	1	150	0	0	150	0	improved agricultural grassland, hedgerows and active quarries and mines; flying, hovering, hunting.	PW
K012	VP3	17/07/2019	18:23	Kestrel	1	20	0	20	0	0	active quarries and mines; mobbing a bz that was perched on quarry wall . calling, then flew down into quarry to southwest.	PW
K013	VP1	18/07/2019	11:40	Kestrel	1	295	0	0	295	0	improved agricultural grassland, hedgerows and conifer plantation; flying, gliding and hanging in wind. soaring, lost when it descended behind wd4.	PW
K014	VP1	29/08/2019	16:31	Kestrel	1	120	10	110	0	0	improved agricultural grassland; flying	JC
K015	VP1	29/08/2019	18:34	Kestrel	1	40	40	0	0	0	improved agricultural grassland; flying, juvenile	JC
K016	VP3	18/09/2019	09:51	Kestrel	1	68	0	68	0	0	improved agricultural grassland; hunting	JK
K017	VP3	18/09/2019	10:34	Kestrel	1	77	0	77	0	0	improved agricultural grassland; hunting	JK
K018	VP1	16/10/2019	13:18	Kestrel	1	217	0	0	217	0	improved agricultural grassland; hunting	PM

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
K019	VP3	12/11/2019	11:13	Kestrel	1	25	0	0	25	0	wet grassland; hunting; female-type	PM
K020	VP3	12/11/2019	11:40	Kestrel	1	139	0	39	100	0	wet grassland and improved agricultural grassland; hunting; landed on dead tree; female-type	PM
K021	VP3	12/11/2019	11:43	Kestrel	1	30	30	0	0	0	improved agricultural grassland; travelling low; took off from dead tree; female-type	PM
K022	VP3	12/11/2019	12:08	Kestrel	1	228	0	128	100	0	improved agricultural grassland; hunting; female-type	PM
K023	VP3	12/11/2019	12:49	Kestrel	1	51	0	0	51	0	improved agricultural grassland; hunting; female-type	PM
K024	VP3	11/12/2019	14:37	Kestrel	1	108	0	108	0	0	wet grassland; hunting	PM
K025	VP3	17/01/2020	12:20	Kestrel	1	35	0	35	0	0	mixed broadleaved/conifer woodland; travelling; landed in tree out of view	PM
K026	VP1	17/02/2020	12:46	Kestrel	1	81	0	0	81	0	wet grassland and improved agricultural grassland; hunting	PM
K027	VP1	16/04/2020	16:50	Kestrel	1	5	5	0	0	0	arable crops and hedgerows; brief low flight	TR
K028	VP3	17/04/2020	15:50	Kestrel	1	300	0	90	210	0	improved agricultural grassland and exposed sand, gravel or till; high circling, female	TR
K029	VP3	17/04/2020	15:55	Kestrel	1	420	0	60	360	0	exposed sand, gravel or till; high circling female, sign of display behaviour	TR
K030	VP3	17/04/2020	17:05	Kestrel	1	60	0	0	60	0	disturbed ground; male, high display type flight	TR

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
K031	VP3	17/04/2020	17:33	Kestrel	1	300	0	100	200	0	wet grassland; high circle and stoop indicating display and breeding territory, hunting also	TR
K032	VP3	17/04/2020	19:05	Kestrel	1	30	0	30	0	0	wet grassland; hunting	TR
K033	VP3	17/04/2020	19:45	Kestrel	1	25	0	25	0	0	conifer plantation; low over trees travelling on	TR
K034	VP3	17/04/2020	20:30	Kestrel	1	90	0	90	0	0	wet grassland; hunting	TR
K035	VP1	25/08/2020	19:09	Kestrel	1	35	0	35	0	0	improved agricultural grassland; hunting	PM
K036	VP1	25/08/2020	20:10	Kestrel	1	27	0	0	27	0	improved agricultural grassland; travelling	PM
K037	VP3	15/09/2020	07:40	Kestrel	1	18	18	0	0	0	improved agricultural grassland and active quarries and mines; flew across in front of vp and settled in dead tree used by bz001. chased by corvids into next tree. still in tree at 7:50, but gone by 8:00. didn't see bird leave or where it went. young male just moulting into adult plumage.	PM
K038	VP3	15/09/2020	11:35	Kestrel	1	10	10	0	0	0	improved agricultural grassland; very brief low flight across front of vp. came out from behind trees right in front of vp, flew north and disappeared behind big tree to right of vp. strange as trees are close to vp but no sign of bird once it had gone behind tree., 11:50 - bird located again near cattle pen to right and just behind vp. chased by corvids and heard calling but not seen again.	PM

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
K039	VP1	18/09/2020	08:50	Kestrel	1	12	12	0	0	0	improved agricultural grassland; juvenile bird perched on the chimney of the house to left of vp then flew off heading south. lost behind trees	PM
K040	VP1	18/09/2020	09:02	Kestrel	1	10	10	0	0	0	improved agricultural grassland; brief view of bird in flight below vp, probably same bird as k003.	PM
K041	VP1	18/09/2020	09:50	Kestrel	1	11	11	0	0	0	improved agricultural grassland; flew up from field next to vp, settled briefly in tree then flew off heading north. lost behind hedgerow.	PM
K042	VP1	18/09/2020	10:48	Kestrel	1	86	0	86	0	0	improved agricultural grassland; hunting in front of vp, heading north to south. dropped below vp, didn't see where it went.	PM
K043	VP1	12/10/2020	16:21	Kestrel	1	165	45	120	0	0	improved agricultural grassland; spotted hovering north of vp. hunted over viewshed heading south before turning north again. lost behind vp over fields on opposite side of road to vp.	PC
K044	VP3	16/02/2021	11:14	Kestrel	1	136	0	97	39	0	improved agricultural grassland and hedgerows; hunting over fields. came from south below sun, lost in brightness under sun, couldn't tell sex as i was looking towards sun. very bright sky.	PDC

Table 7 - 4 - 34 Kestrel Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
K001	27/10/2020	08:30	Kestrel	1	improved agricultural grassland and hedgerows; perched on telegraph pole at side of road (wintering)	PC
K002	24/03/2021	12:01	Kestrel	1	improved grassland and treelines; brief view in flight (wintering)	PDC
K003	24/03/2021	12:57	Kestrel	1	improved agricultural grassland; female hunting over field (wintering)	PDC

Table 7 - 4 - 35 Kestrel Breeding Raptor Survey

Map Ref.	BRVP	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
K001	RVP4	30/04/2019	14:41	Kestrel	1	conifer plantation and improved agricultural grassland, hunting	suitable nesting habitat; possible breeder	JC
K002	RVP4	31/05/2019	10:11	Kestrel	1	semi-natural woodland, scrub and improved agricultural grassland, hunting	suitable nesting habitat; possible breeder	JC
K003	RVP4	26/06/2019	15:58	Kestrel	1	improved agricultural grassland and hedgerows, hunting male, perched for a minute by rvp	suitable nesting habitat; possible breeder	JC
K004	RVP1	12/06/2020	07:15	Kestrel	1	wet willow-alder-ash woodland and bog woodland, flight	suitable nesting habitat; possible breeder	NG
K005	RVP2	12/06/2020	15:45	Kestrel	1	raised bog, mixed conifer woodland and wet willow-alder-ash woodland, hunting	suitable nesting habitat; possible breeder	NG

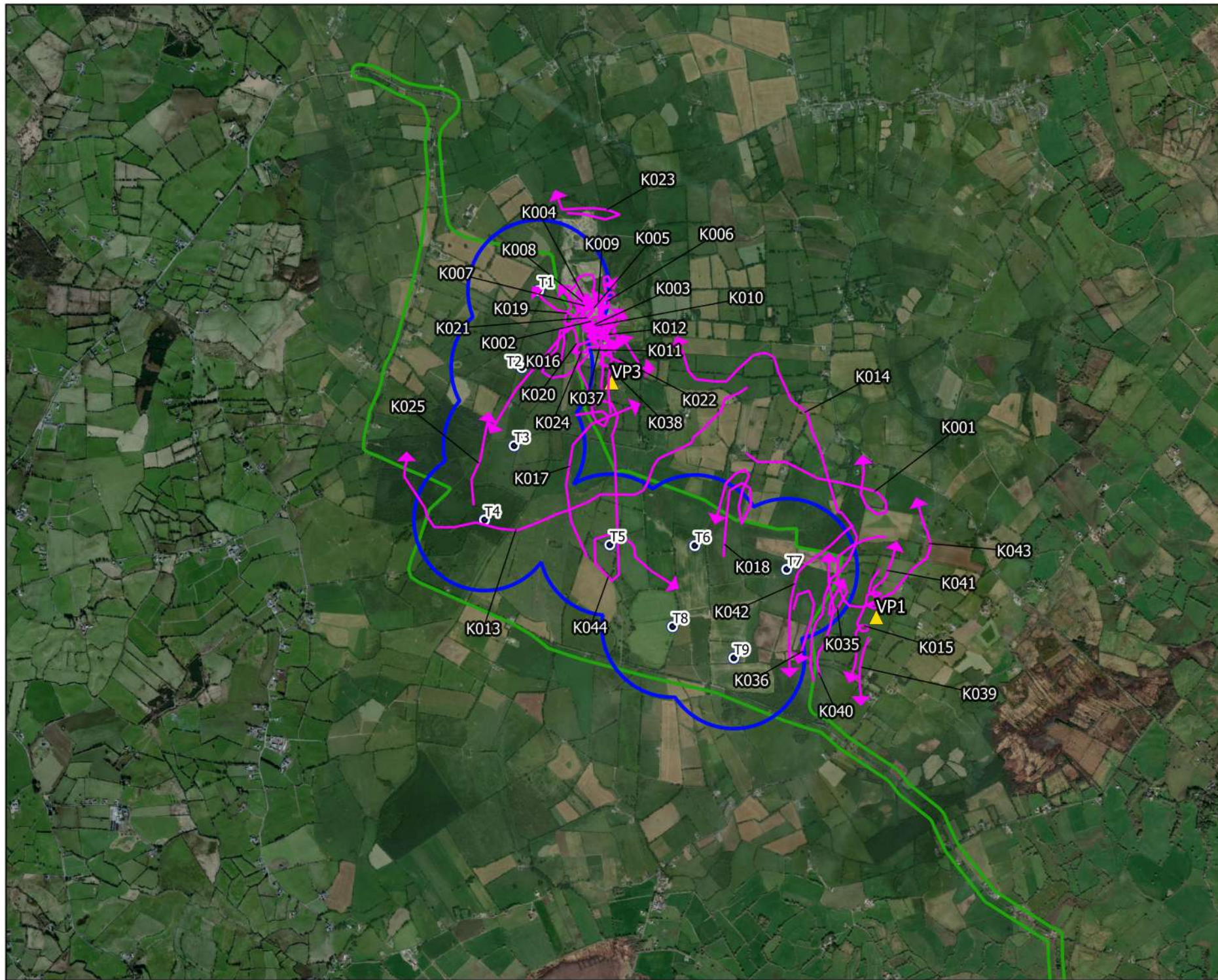
Table 7 - 4 - 36 Kestrel Incidental Records

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
K001	Waterfowl Distribution Survey; Moyvoughly Bog	10/08/2020	11:22	Kestrel	2	cutover bog; travelling, incidental - 2 females	PM
K002	Waterfowl Distribution Survey; Dungolman River	02/11/2020	-	Kestrel	1	improved agricultural grassland; male flew across road and settled in roadside tree.	PC
K003 & K004	Waterfowl Distribution Survey; Rosemount	02/11/2020	-	Kestrel	2	improved agricultural grassland; one in flight over road to rosemount from ballymore and one in flight nearer to rosemount.	PC
K005	Waterfowl Distribution Survey; Farmland near Raheen	14/01/2021	12:54	Kestrel	1	improved agricultural grassland and hedgerows; perching	KOC
K006	Waterfowl Distribution Survey; Moyvoughly Bog	28/01/2021	10:16	Kestrel	1	cutover bog; flying	KOC
K007	Waterfowl Distribution Survey; Moyvoughly Bog	28/01/2021	10:37	Kestrel	1	cutover bog; flying, hunting	KOC
K008	Waterfowl Distribution Survey; Moyvoughly Bog	22/03/2021	11:11	Kestrel	1	treelines and bogs; perched in tree at side of road then flew off towards bog	PDC
K009	Waterfowl Distribution Survey; Moyvoughly Bog	22/03/2021	11:49	Kestrel	1	improved agricultural grassland; flying alongside road	PDC
K010	Waterfowl Distribution Survey; Raheen	22/03/2021	11:52	Kestrel	2	improved agricultural grassland and treelines; one in flight seemed to flush second bird from field.	PDC

Table 7 - 4 - 37 Kestrel Supplementary Data

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
K001	VP2b	22/07/2019	17:44	Kestrel	1	40	0	40	0	0	improved agricultural grassland and hedgerows; flew low across fields after	PW

											flushing a flock of goldfinches, mobbed by swallows and house martins.	
K002	VP4	27/08/2019	16:36	Kestrel	1	600	100	100	400	0	improved agricultural grassland, hedgerows and conifer plantation; hunting	JC
K003	VP4	27/08/2019	16:51	Kestrel	1	15	0	5	10	0	conifer plantation; hunting	JC
K004	VP4	27/08/2019	17:32	Kestrel	1	40	0	5	35	0	improved agricultural grassland and hedgerows; hunting	JC
K005	VP4	27/08/2019	18:03	Kestrel	1	60	0	20	40	0	improved agricultural grassland and hedgerows; hunting, mobbed	JC
K006	VP4	27/08/2019	20:17	Kestrel	1	40	5	0	35	0	improved agricultural grassland; hunting	JC



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ VP Locations
- Flight Observation



Drawing Title

**Kestrel Vantage Point Survey
Observations**

Project Title

**Umma More Renewable Energy
Development**

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-32

Scale

1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title:
**Kestrel Winter Walkover Survey
Observations**

Project Title:
**Umma More Renewable Energy
Development**

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-33
Scale: 1:35000	Date: 31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 2km Survey Radius
- ▲ RVP Locations
- Flight Observation



Drawing Title:
**Kestrel Breeding Raptor Survey
Observations**

Project Title:
Umma More Renewable Energy
Development

Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4-34
Scale	Date
1:50000	31.01.23



MKO
Planning and
Environmental
Consultants
Tuan Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- Flight Observation



Drawing Title:

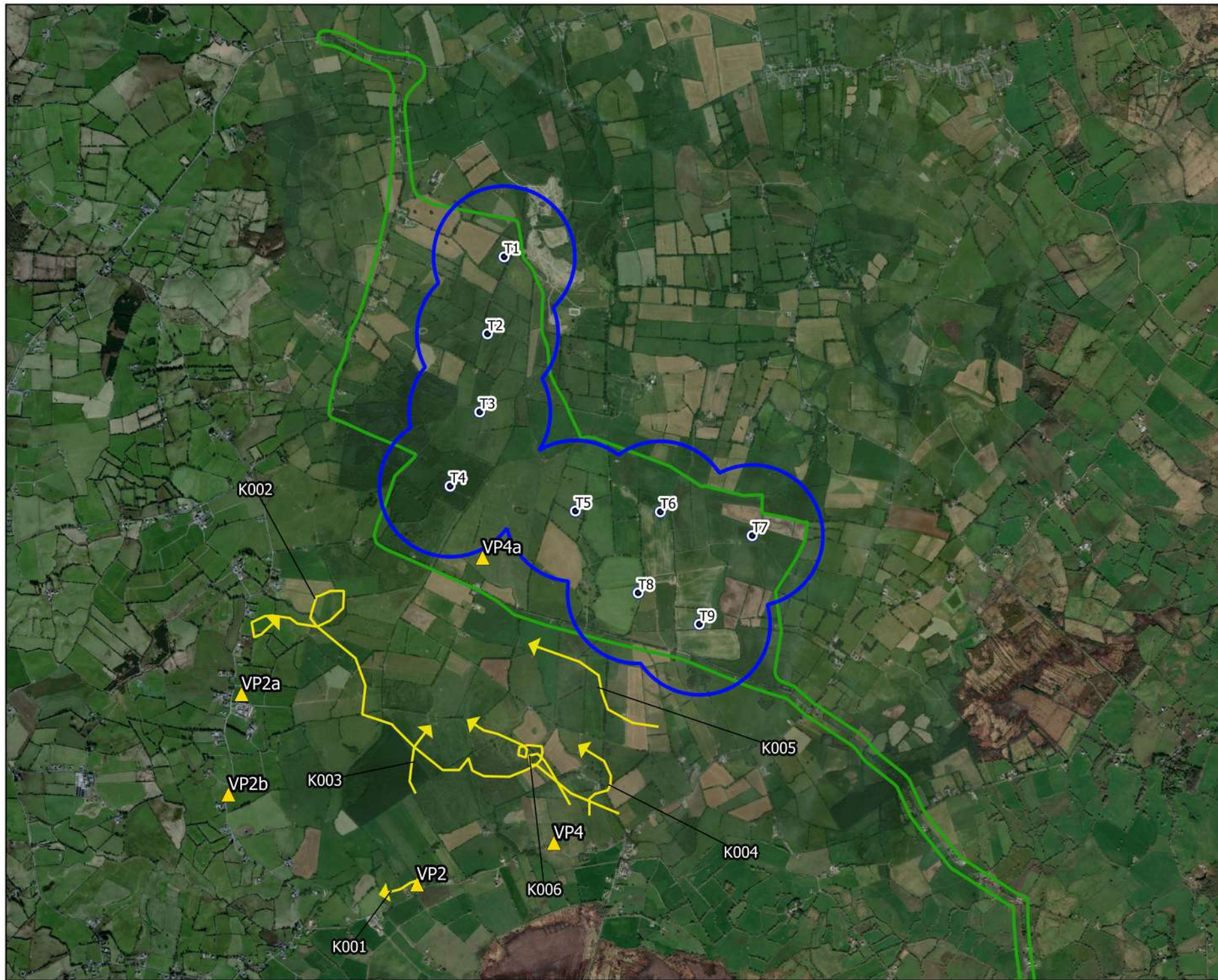
Kestrel Incidental Records

Project Title:

Umma More Renewable Energy Development

Drawn By:	Checked By:
D. Woods	P. Cregg
Project No:	Drawing No:
201050	Fig. 7-4-35
Scale:	Date:
1:50000	31.01.23

MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- Flight Observation



Drawing Title

Kestrel Supplementary Data

Project Title:
Umma More Renewable Energy Development

Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4-36
Scale	Date
1:35000	09.02.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie

12.

BUZZARD

Table 7 - 4 - 38 Buzzard Vantage Point Survey (flights)

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ001	VP3	29/04/2019	17:23	Buzzard	1	25	0	25	0	0	improved agricultural grassland, hedgerows and conifer plantation; flying, mobbed by ro's, flying s	JC
BZ002	VP3	21/05/2019	10:01	Buzzard	1	360	0	0	150	210	conifer plantation, improved agricultural grassland and hedgerows; hunting	JC
BZ003	VP3	21/05/2019	10:11	Buzzard	1	20	0	10	10	0	improved agricultural grassland; flying, a different bird to previous	JC
BZ004	VP1	22/05/2019	09:23	Buzzard	1	25	0	0	25	0	improved agricultural grassland and treelines; flying	JC
BZ005	VP3	24/06/2019	13:09	Buzzard	1	20	0	0	20	0	improved agricultural grassland and treelines; mobbed, mobbed by several hundred ro and jd offsite	JC
BZ006	VP3	24/06/2019	13:32	Buzzard	1	120	0	0	120	0	improved agricultural grassland and treelines; soaring, moved off site	JC
BZ007	VP3	24/06/2019	14:10	Buzzard	1	20	0	20	0	0	improved agricultural grassland; flying	JC
BZ008	VP3	24/06/2019	14:36	Buzzard	2	120	0	20	100	0	improved agricultural grassland; pair flying and soaring. calling repeatedly	JC
BZ009	VP1	27/06/2019	10:11	Buzzard	1	360	20	40	300	0	conifer plantation, improved agricultural grassland and wet grassland; hunting	JC
BZ010	VP1	27/06/2019	10:12	Buzzard	1	20	0	0	20	0	conifer plantation; circling, noticed while observing other	JC

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ011	VP1	27/06/2019	11:36	Buzzard	1	20	0	0	20	0	conifer plantation and improved agricultural grassland; flying	JC
BZ012	VP1	27/06/2019	12:21	Buzzard	1	30	0	20	10	0	treelines and improved agricultural grassland; flying	JC
BZ013	VP1	27/06/2019	15:06	Buzzard	1	180	5	35	100	40	improved agricultural grassland, hedgerows and conifer plantation; flying	JC
BZ014	VP1	16/07/2019	21:03	Buzzard	1	300	300	0	0	0	improved agricultural grassland and hedgerows; perched on a tree in w11. dropped off perch at 21:08 and lost from view down the slope to the west.	PW
BZ015	VP3	17/07/2019	14:04	Buzzard	2	120	0	20	100	0	conifer plantation; one bz flying met another bz at area marked on map, both bz dropped and were lost from view.	PW
BZ016	VP3	17/07/2019	16:00	Buzzard	1	30	0	5	25	0	conifer plantation; soaring before dropping down and flying/gliding over trees and lost from view.	PW
BZ017	VP3	17/07/2019	16:14	Buzzard	1	270	0	0	270	0	improved agricultural grassland, hedgerows and active quarries and mines; soaring and calling over quarry, then ga1 and w11.	PW
BZ018	VP3	17/07/2019	17:58	Buzzard	1	60	0	0	60	0	improved agricultural grassland and hedgerows; soaring over farmland	PW
BZ019	VP3	17/07/2019	18:23	Buzzard	1	15	0	0	15	0	conifer plantation; soaring	PW
BZ020	VP3	17/07/2019	18:23	Buzzard	1	15	0	15	0	0	improved agricultural grassland, hedgerows and active quarries and mines; perched and then flying, mobbed by k and then flew to ga1, lost behind w11 to east.	PW

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ021	VP1	18/07/2019	10:02	Buzzard	1	145	0	15	130	0	improved agricultural grassland, hedgerows and arable crops; soaring and gliding over maize crop.	PW
BZ022	VP1	18/07/2019	11:20	Buzzard	1	60	0	5	55	0	improved agricultural grassland and hedgerows; soaring, dropped down and was lost from view.	PW
BZ023	VP1	18/07/2019	12:20	Buzzard	2	450	0	0	450	0	improved agricultural grassland and hedgerows; soaring	PW
BZ024	VP1	29/08/2019	15:54	Buzzard	1	25	10	15	0	0	improved agricultural grassland; flying	JC
BZ025	VP3	31/08/2019	15:21	Buzzard	1	35	0	35	0	0	conifer plantation; flying	JC
BZ026	VP3	31/08/2019	15:55	Buzzard	2	180	30	30	120	0	conifer plantation, improved agricultural grassland and treelines; hunting, one juvenile	JC
BZ027	VP3	31/08/2019	20:56	Buzzard	1	220	10	10	200	0	conifer plantation and improved agricultural grassland; hunting	JC
BZ028	VP1	11/09/2019	11:37	Buzzard	1	118	0	0	118	0	improved agricultural grassland; soaring / travelling, male	JK
BZ029	VP3	18/09/2019	07:20	Buzzard	1	42	0	42	0	0	improved agricultural grassland; travelling	JK
BZ030	VP3	18/09/2019	11:48	Buzzard	2	237	0	0	237	0	improved agricultural grassland; soaring / travelling	JK
BZ031	VP1	16/10/2019	16:01	Buzzard	2	165	0	0	150	0	improved agricultural grassland; soaring	PM
BZ032	VP1	16/10/2019	16:46	Buzzard	2	123	0	33	90	0	improved agricultural grassland; circling/travelling	PM

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ033	VP3	24/10/2019	14:49	Buzzard	1	45	45	0	0	0	improved agricultural grassland; travelling low	PM
BZ034	VP1	13/11/2019	12:42	Buzzard	1	135	0	0	75	0	improved agricultural grassland; travelling	PM
BZ035	VP1	10/12/2019	12:44	Buzzard	1	12	12	0	0	0	improved agricultural grassland; travelling low near hedge	PM
BZ036	VP3	11/12/2019	11:03	Buzzard	1	45	45	0	0	0	wet grassland; hunting low	PM
BZ037	VP1	11/12/2019	11:13	Buzzard	1	24	24	0	0	0	improved agricultural grassland; travelling low	PM
BZ038	VP3	11/12/2019	11:18	Buzzard	1	12	12	0	0	0	wet grassland; travelling low; landed in trees	PM
BZ039	VP3	11/12/2019	11:36	Buzzard	1	68	68	0	0	0	wet grassland; hunting low; landed in tree	PM
BZ040	VP3	11/12/2019	13:33	Buzzard	1	45	0	45	0	0	wet grassland and mixed broadleaved/conifer woodland; travelling; mobbed by corvids	PM
BZ041	VP3	17/01/2020	09:20	Buzzard	1	65	65	0	0	0	improved agricultural grassland; travelling low	PM
BZ042	VP3	17/01/2020	10:25	Buzzard	1	10	0	10	0	0	improved agricultural grassland; travelling	PM
BZ043	VP3	13/02/2020	12:17	Buzzard	1	419	0	319	100	0	improved agricultural grassland; soaring/travelling	PM
BZ044	VP3	13/02/2020	14:00	Buzzard	5	286	0	0	286	0	mixed broadleaved/conifer woodland; circling	PM

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ045	VP3	13/02/2020	14:57	Buzzard	1	15	0	15	0	0	improved agricultural grassland; travelling; landed in tree	PM
BZ046	VP1	17/02/2020	13:43	Buzzard	2	315	0	0	315	0	wet grassland and improved agricultural grassland; soaring	PM
BZ047	VP1	17/02/2020	13:57	Buzzard	1	15	0	0	15	0	improved agricultural grassland; hunting	PM
BZ048	VP1	23/03/2020	12:06	Buzzard	1	120	0	0	120	0	improved agricultural grassland; soaring , soaring over same area as obs no1 c100m-150m	ED
BZ049	VP3	27/03/2020	10:20	Buzzard	1	35	0	0	35	0	improved agricultural grassland; soaring , short flight	ED
BZ050	VP1	16/04/2020	15:41	Buzzard	2	215	0	0	215	0	improved agricultural grassland and hedgerows; circling area	TR
BZ051	VP1	16/04/2020	16:56	Buzzard	1	90	0	0	90	0	hedgerows, improved agricultural grassland and hedgerows; gliding and circling area	TR
BZ052	VP1	16/04/2020	17:25	Buzzard	1	110	0	0	110	0	wet grassland and improved agricultural grassland; displaying briefly	TR
BZ053	VP1	16/04/2020	17:30	Buzzard	1	65	0	0	65	0	wet grassland and hedgerows; slow glide	TR
BZ054	VP3	17/04/2020	15:45	Buzzard	1	240	0	0	240	0	improved agricultural grassland and hedgerows; circling	TR
BZ055	VP3	17/04/2020	17:28	Buzzard	1	20	0	20	0	0	improved agricultural grassland and highly modified/non-native woodland; gliding on wind	TR
BZ056	VP3	17/04/2020	18:50	Buzzard	1	300	0	0	300	0	conifer plantation; circling and gliding on wind, good breeding habitat	TR

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ057	VP3	17/04/2020	19:05	Buzzard	1	15	15	0	0	0	mixed broadleaved woodland and conifer plantation; low over trees landing on tree	TR
BZ058	VP3	17/04/2020	19:23	Buzzard	2	20	20	0	0	0	hedgerows; landing on ash tree	TR
BZ059	VP3	14/05/2020	09:10	Buzzard	1	60	0	0	60	0	mixed conifer woodland; soaring	NG
BZ060	VP3	14/05/2020	11:25	Buzzard	1	35	5	0	30	0	tiled land and cultivated land; circling, then landed in mown field	NG
BZ061	VP1	24/06/2020	10:21	Buzzard	2	34	5	29	0	0	improved agricultural grassland; came up from just north of vp, circled over vs a couple of times then travelled behind vp. lost behind treeline.	PC
BZ062	VP3	29/06/2020	06:31	Buzzard	1	69	64	0	0	0	improved agricultural grassland; flew up from trees in front of vp. circled then travelled west.	PC
BZ063	VP3	29/06/2020	06:35	Buzzard	2	95	28	67	0	0	improved agricultural grassland; pair came up calling from where bz002 went. circled low then travelled behind vp to south	PC
BZ064	VP3	29/06/2020	07:20	Buzzard	1	142	12	130	0	0	improved agricultural grassland; came from behind vp, circled into viewshed then out again, hanging in wind and circling behind vp to nw.	PC
BZ065	VP3	29/06/2020	09:20	Buzzard	1	0	0	0	0	0	improved agricultural grassland; spotted feeding on the ground in same field as bh012 had been feeding in. watched for couple of minutes, no flight. lost behind hedgerow. marked on map with x inside a circle.	PC
BZ066	VP3	26/08/2020	15:35	Buzzard	1	466	0	66	400	0	improved agricultural grassland, wet grassland and active quarries and mines; travelling	PM

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ067	VP3	26/08/2020	16:05	Buzzard	3	1295	0	0	695	600	improved agricultural grassland, wet grassland and active quarries and mines; soaring together	PM
BZ068	VP3	26/08/2020	16:18	Buzzard	2	82	0	0	82	0	improved agricultural grassland; travelling	PM
BZ069	VP3	26/08/2020	17:23	Buzzard	1	150	0	0	150	0	improved agricultural grassland; travelling	PM
BZ070	VP3	26/08/2020	17:36	Buzzard	1	249	0	0	249	0	improved agricultural grassland and active quarries and mines; soaring/travelling	PM
BZ071	VP3	26/08/2020	21:19	Buzzard	1	20	20	0	0	0	active quarries and mines; flew from gravel pile, low across quarry	PM
BZ072	VP3	15/09/2020	06:45	Buzzard	2	21	21	0	0	0	improved agricultural grassland; appeared to be feeding in field next to vp, which had been mowed recently. flew up out of field and settled in dead tree near quarry. not sure where they went from the tree, but seemed to be chased off by mixed corvids.	PM
BZ073	VP3	15/09/2020	10:37	Buzzard	1	194	95	79	20	0	improved agricultural grassland and conifer plantation; came up out of copse opposite vp, circled to gain height then travelled south following ridge. eventually lost against sky, but heard calling. sounded close but unable to locate calling bird. not sure if it was another buzzard or same bird.	PM
BZ074	VP3	08/10/2020	11:35	Buzzard	1	242	242	0	0	0	improved agricultural grassland and active quarries and mines; came up from near quarry, circling over and behind vp. flushed bz002 from behind vp. disappeared with bz002 behind vp.	PC

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ075	VP3	08/10/2020	11:37	Buzzard	1	35	35	0	0	0	improved agricultural grassland and active quarries and mines; joined bz001 from behind vp, circling briefly over vp then headed east behind vp.	PC
BZ076	VP3	08/10/2020	11:45	Buzzard	1	62	17	45	0	0	improved agricultural grassland; came from south of vp, circled in front of vp climbing. lost against clouds.	PC
BZ077	VP3	08/10/2020	12:06	Buzzard	1	151	0	35	116	0	improved agricultural grassland; came from behind vp heading west. lots of calling. eventually lost against clouds.	PC
BZ078	VP3	08/10/2020	12:25	Buzzard	1	71	0	0	71	0	improved agricultural grassland and conifer plantation; picked up in the distance to south. travelled east to west at height over viewshed.	PC
BZ079	VP3	08/10/2020	15:32	Buzzard	1	164	0	36	128	0	improved agricultural grassland and active quarries and mines; travelled from behind vp over viewshed before heading back east whilst gaining height. lost against clouds.	PC
BZ080	VP1	12/10/2020	12:38	Buzzard	1	69	0	69	0	0	improved agricultural grassland; came up from below vp, didn't see exactly where from. circled then travelled south over viewshed.	PC
BZ081	VP1	12/10/2020	14:55	Buzzard	1	91	91	0	0	0	improved agricultural grassland; came up from north below vp. hanging almost stationary in air at times by flying into wind, then headed south. lost low over viewshed.	PC
BZ082	VP1	04/11/2020	12:30	Buzzard	1	13	13	0	0	0	improved agricultural grassland and hedgerows; seen briefly in flight being mobbed and chased off to the east by 2 rooks. lost behind hedgerows.	PC
BZ083	VP1	04/11/2020	12:40	Buzzard	1	28	28	0	0	0	improved agricultural grassland and hedgerows; came from behind vp and travelled north over viewshed. lost	PC

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
											behind trees. probably same bird as bz003 as it came from the general direction z3 had gone.	
BZ084	VP3	05/11/2020	07:45	Buzzard	1	0	0	0	0	0	improved agricultural grassland, hedgerows and active quarries and mines; perched in tree in front of vp calling. didn't see it arrive. , i assume bz001 and bz002 are the usual pair of buzzards that are around vp3.	PC
BZ085	VP3	05/11/2020	07:45	Buzzard	1	21	21	0	0	0	improved agricultural grassland, hedgerows and active quarries and mines; flew behind other bz. short low flight then settled in tree, calling.	PC
BZ086	VP3	05/11/2020	11:06	Buzzard	1	27	27	0	0	0	improved agricultural grassland and hedgerows; brief flight low to ground over viewshed. lost bird entered small copse and hedgerow.	PC
BZ087	VP3	15/12/2020	11:44	Buzzard	1	38	38	0	0	0	improved agricultural grassland; flew low towards vp before alighting in tree calling.	PC
BZ088	VP3	15/12/2020	11:47	Buzzard	2	51	51	0	0	0	improved agricultural grassland and conifer plantation; flew out of plantation to south west of vp, heading north. lost when they flew close to sun., calling in response to single bird which appeared just before this pair.	PC
BZ089	VP3	07/01/2021	08:27	Buzzard	1	56	0	0	56	0	improved agricultural grassland; travelling; calling	PM
BZ090	VP1	21/01/2021	13:37	Buzzard	1	25	0	0	25	0	improved agricultural grassland; travelling	PM
BZ091	VP3	16/02/2021	11:58	Buzzard	2	61	0	50	11	0	improved grassland and treelines; flew out of viewshed heading east., third bird heard calling opposite quarry	PDC

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ092	VP3	16/02/2021	12:17	Buzzard	1	23	0	23	0	0	improved grassland; flew out of viewshd heading east, following course of other 2 bz	PDC
BZ093	VP3	16/02/2021	12:56	Buzzard	1	41	0	0	41	0	improved grassland; flew into viewshed from north. lost behind trees., presumably same bird as previous sighting. calling a lot.	PDC
BZ094	VP3	23/03/2021	07:15	Buzzard	1	44	44	0	0	0	improved grassland and treelines; flew out of trees below vp heading west then settled in trees opposite vp, calling.	PDC
BZ095	VP3	23/03/2021	09:34	Buzzard	1	19	0	0	19	0	improved grassland and highly modified/non-native woodland; flew across viewshed heading south. lost against dark background, hard to hold bins steady due to wind	PDC
	VP3	17/07/2019	13:27	Buzzard	1	1230	0	0	0	0		PW
	VP3	05/11/2020	07:45	Buzzard	2	0	0	0	0	0	improved agricultural grassland, hedgerows and active quarries and mines; calling from 7:45 to about 8:30, but i couldn't see either due to the poor light., not mapped	PC

Table 7 - 4 - 39 Buzzard Vantage Point Survey (non-flight)

Map Ref.	VP	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ096	VP3	13/02/2020	12:24	Buzzard	1	treelines; perched in tree	PM
BZ097	VP3	08/07/2020	07:55	Buzzard	1	improved agricultural grassland and active quarries and mines; perched in dead tree near quarry, silent. presumably same bird that was in another tree behind vp at 5:20am.	PC

BZ098	VP3	16/02/2021	12:01	Buzzard	1	hedgerows and improved grassland; heard calling when other 2 bz were in flight. couldn't locate it, this is best guess of location	PC
BZ099	VP3	16/02/2021	13:53	Buzzard	1	improved grassland; lots of calling but bird isn't visible. assume it's the other side of the hill behind the quarry	PC

Table 7 - 4 - 40 Buzzard Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ001	25/10/2019	12:56	Buzzard	1	wet grassland; travelling; calling (wintering)	PM
BZ002	16/12/2019	09:55	Buzzard	2	improved agricultural grassland; chasing/fighting, fell to ground, talon in talon (wintering)	PM
BZ003	16/12/2019	10:29	Buzzard	2	improved agricultural grassland; circling before flying down field and landing in tree (wintering)	PM
BZ004	16/12/2019	10:38	Buzzard	1	improved agricultural grassland and mixed broadleaved/conifer woodland; flew into tree (wintering)	PM
BZ005	16/12/2019	11:44	Buzzard	1	wet grassland; travelling (wintering)	PM
BZ006	16/12/2019	14:46	Buzzard	1	improved agricultural grassland; travelling (wintering)	PM
BZ007	22/01/2020	10:20	Buzzard	1	improved agricultural grassland; circling/calling (wintering)	PM
BZ008	01/03/2020	10:47	Buzzard	1	improved agricultural grassland; in flight c 40m (wintering)	ED
BZ009	27/10/2020	09:25	Buzzard	1	improved agricultural grassland and hedgerows; perched on small tree in hedgerow with wings drooping like a tired cormorant!, perched on small tree in hedgerow with wings drooping like a tired cormorant! (wintering)	PC
BZ010	27/10/2020	11:25	Buzzard	1	improved agricultural grassland and hedgerows; perched in tree in hedgerow alongside track. flushed and flew off in easterly direction., perched in tree in hedgerow alongside track. flushed and flew off in easterly direction. (wintering)	PC
BZ011	27/10/2020	13:00	Buzzard	1	improved agricultural grassland, hedgerows and active quarries and mines; in flight over fields and quarry next to vp3. there's always a buzzard or two here., in flight over fields and quarry next to vp3. there's always a buzzard or two here. (wintering)	PC

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ012	25/02/2021	11:43	Buzzard	2	improved grassland; flew across from nw and headed off to the east. lots of calling. (wintering)	PDC
BZ013	25/02/2021	11:45	Buzzard	1	improved grassland; third bird soaring above other 2 bz. lost as it headed east. (wintering)	PDC
BZ014	25/02/2021	11:46	Buzzard	2	improved grassland; pair came back from east, heading west cycling and calling (wintering)	PDC
BZ015	25/02/2021	12:04	Buzzard	1	improved grassland; circling over an esker, being mobbed by hc (wintering)	PDC
BZ016	24/03/2021	10:44	Buzzard	3	improved grassland and conifer plantation; circling together over fields and plantation (wintering)	PDC
BZ017	24/03/2021	12:02	Buzzard	1	improved grassland and treelines; flew up from field and settled in tree (wintering)	PDC

Table 7 - 4 - 41 Buzzard Breeding Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
n/a	19/04/2019	12:01	Buzzard	1	scrub, improved agricultural grassland and treelines; perched into tree (suitable nesting habitat; possible breeder)	JC
n/a	19/04/2019	13:30	Buzzard	1	conifer plantation; soaring, hunting (suitable nesting habitat; possible breeder)	JC
n/a	19/04/2019	-	Buzzard	2	disturbed ground, scrub and semi-natural grassland; pair, circling (pair; probable breeding)	JC
BZ001	25/04/2019	-	Buzzard	2	conifer plantation, wet grassland and treelines; pair circled calling(pair; probable breeding)	JC
BZ002	30/05/2019	-	Buzzard	1	treelines, improved agricultural grassland and wet grassland; agitated behaviour (agitated behaviour; probable breeding)	JC

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ003	28/06/2019	13:42	Buzzard	3	treelines; recently fledged (fledged young; confirmed breeding)	JC
BZ004	17/05/2020	-	Buzzard	1	improved agricultural grassland and semi-natural woodland; flying, perching in trees (suitable nesting habitat; possible breeder)	NG
BZ005	24/05/2020	-	Buzzard	1	cultivated land; soaring (suitable nesting habitat; possible breeder)	NG
BZ006	31/07/2020	09:13	Buzzard	2	improved agricultural grassland and treelines; travelling, calling, landed in tree (suitable nesting habitat; possible breeder)	PM
BZ007	31/07/2020	09:18	Buzzard	1	improved agricultural grassland; travelling (suitable nesting habitat; possible breeder)	PM

Table 7 - 4 - 42 Buzzard Breeding Raptor Survey

Map Ref.	BRVP	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
BZ001	RVP3	30/04/2019	10:22	Buzzard	1	conifer plantation and improved agricultural grassland, soaring	suitable nesting habitat; possible breeder	JC
BZ002	RVP1	24/05/2019	09:35	Buzzard	1	linear woodland/scrub, flying to s, mobbed by ro	suitable nesting habitat; possible breeder	JC
BZ003	RVP7	24/05/2019	11:45	Buzzard	1	raised bog and semi-natural woodland, flying	suitable nesting habitat; possible breeder	JC
BZ004	RVP3	24/05/2019	15:30	Buzzard	2	raised bog and semi-natural woodland, pair flying	pair; probable breeding	JC
BZ005	RVP4	31/05/2019	11:28	Buzzard	1	semi-natural woodland, scrub and improved agricultural grassland, hunting	suitable nesting habitat; possible breeder	JC

Map Ref.	BRVP	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
BZ006	RVP4	31/05/2019	11:41	Buzzard	1	semi-natural woodland, scrub and improved agricultural grassland, hunting	suitable nesting habitat; possible breeder	JC
BZ007	RVP7	25/06/2019	15:45	Buzzard	1	bogs, scrub and semi-natural woodland, hunting, 5 min	suitable nesting habitat; possible breeder	JC
BZ008	RVP8	26/06/2019	17:25	Buzzard	1	improved agricultural grassland and treelines,	suitable nesting habitat; possible breeder	JC
BZ009	RVP7	15/07/2019	12:45	Buzzard	1	wet grassland and treelines, flying, off-site s	suitable nesting habitat; possible breeder	JC
BZ010	RVP3	15/07/2019	16:24	Buzzard	1	mixed broadleaved woodland, juvenile, perched on branch, flew to ground. breeding	fledged young; confirmed breeding	JC
BZ011	RVP9	15/07/2019	17:21	Buzzard	1	conifer plantation and improved agricultural grassland, hunting	suitable nesting habitat; possible breeder	JC
BZ012	RVP1	11/05/2020	12:48	Buzzard	1	cultivated land, soaring above agri land	suitable nesting habitat; possible breeder	NG
BZ013	RVP1	11/05/2020	12:00	Buzzard	1		suitable nesting habitat; possible breeder	NG
BZ014	RVP4	11/05/2020	17:35	Buzzard	1	cultivated land, mobbed by corvid	suitable nesting habitat; possible breeder	NG
BZ015	RVP5	11/05/2020	18:15	Buzzard	1	cultivated land, soaring above agri land	suitable nesting habitat; possible breeder	NG
BZ016	RVP6	11/05/2020	18:30	Buzzard	1	cultivated land, soar then flight	suitable nesting habitat; possible breeder	NG
BZ017	RVP3	13/05/2020	12:00	Buzzard	1	cultivated land and dry meadows and grassy verges, soar	suitable nesting habitat; possible breeder	NG

Map Ref.	BRVP	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
BZ018	RVP3	13/05/2020	07:12	Buzzard	1	cultivated land and dry meadows and grassy verges, mobbed, mobbed	suitable nesting habitat; possible breeder	NG
BZ019	RVP1	12/06/2020	08:00	Buzzard	1		suitable nesting habitat; possible breeder	NG
BZ020	RVP1	12/06/2020	09:00	Buzzard	1	#N/A	suitable nesting habitat; possible breeder	NG
BZ021	RVP2	12/06/2020	15:45	Buzzard		#N/A	suitable nesting habitat; possible breeder	NG
BZ022	RVP2	12/06/2020	16:40	Buzzard	1	#N/A	suitable nesting habitat; possible breeder	NG
BZ023	RVP4	26/06/2020	08:20	Buzzard	1	improved agricultural grassland, hunting	suitable nesting habitat; possible breeder	JK
BZ024	RVP7	26/06/2020	10:25	Buzzard	1	cutover bog, hunting	suitable nesting habitat; possible breeder	JK
BZ025	RVP5	26/06/2020	15:00	Buzzard	2	cutover bog, hunting	suitable nesting habitat; possible breeder	JK
	RVP7	23/07/2020	No flight	Buzzard	1	bogs and mixed broadleaved/conifer woodland, , heard calling from the woodland near the end of bog road.	suitable nesting habitat; possible breeder	PC
BZ026	RVP8	28/07/2020	06:10	Buzzard	1	improved agricultural grassland, mixed broadleaved woodland and treelines, , flew across road, not sure where from, settling in tree in treeline.	suitable nesting habitat; possible breeder	PC
BZ027	RVP8	28/07/2020	06:11	Buzzard	1	improved agricultural grassland, mixed broadleaved/conifer woodland and treelines, , followed bz001, settled in same tree. both calling, watched in tree for a few minutes, didn't see them leave.	pair; probable breeding	PC
BZ028	RVP8	28/07/2020	06:25	Buzzard	2	#N/A	pair; probable breeding	PC

Table 7 - 4 - 43 Buzzard Incidental Records

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ001	Waterfowl Distribution Survey; Flying NE into southern section of site	12/05/2020		Buzzard	1	improved agricultural grassland; , travelling ne across farmland	PM
n/a	Waterfowl Distribution Survey; Ballymore	23/10/2020		Buzzard	1	improved agricultural grassland; in flight, mobbed by corvids, as you come into town from lough sewdy, not mapped	PC
BZ002	Waterfowl Distribution Survey; Farmland near Cartroncooragh	14/01/2021	13:31	Buzzard	1	improved agricultural grassland; circling	KOC
BZ003	Waterfowl Distribution Survey; Cooleen	28/01/2021	16:04	Buzzard	1	improved agricultural grassland; gliding, perching	KOC
BZ004	Waterfowl Distribution Survey;	25/02/2021	10:57	Buzzard	1	improved agricultural grassland; in low flight over fields	PDC
BZ005	Waterfowl Distribution Survey; Moyvoughly bog	22/03/2021	10:50	Buzzard	1	bogs; soaring over bog	PDC
BZ006	Waterfowl Distribution Survey; Moyvoughly bog	22/03/2021	11:00	Buzzard	1	improved agricultural grassland; brief view of bird low in flight over field	PDC

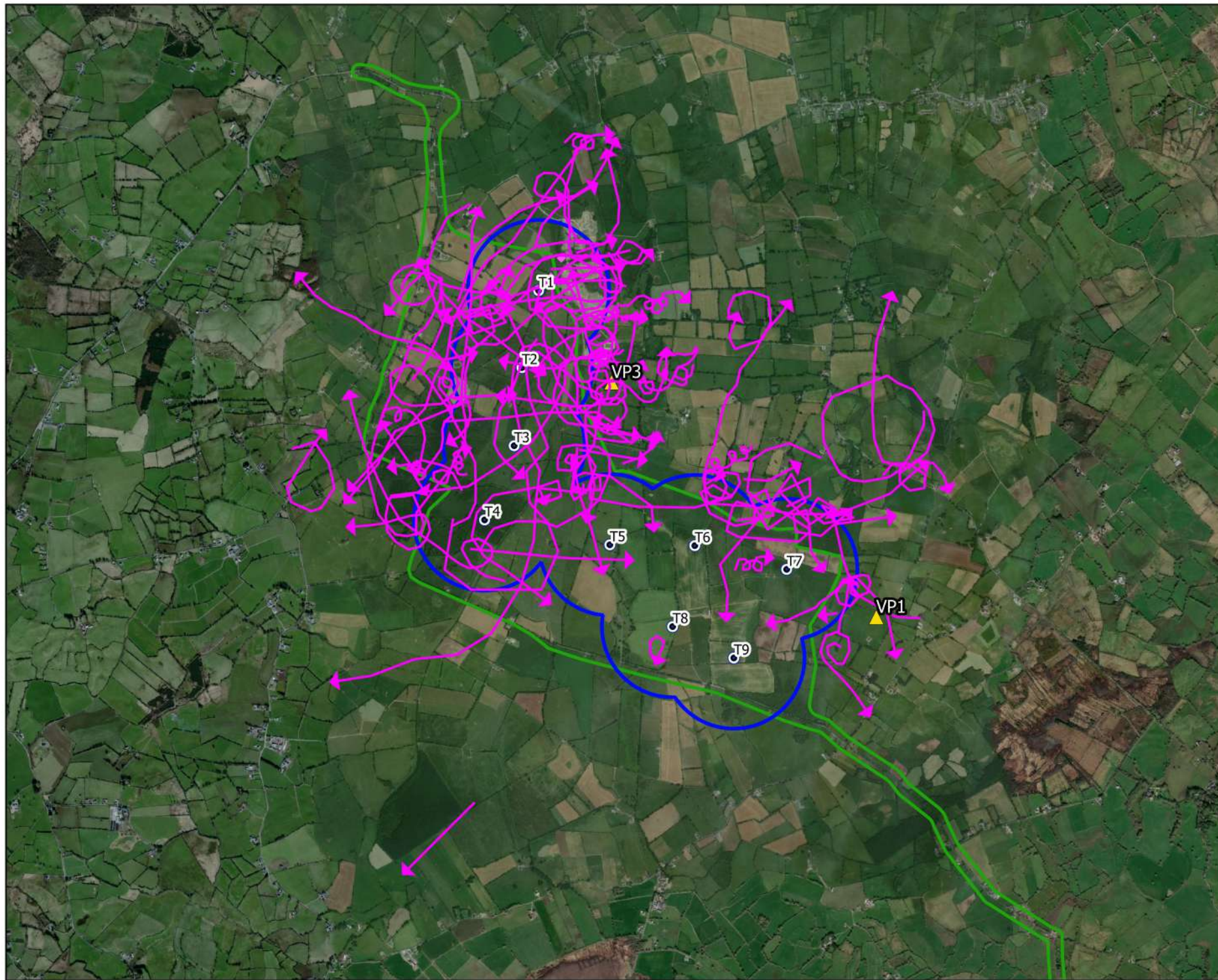
Table 7 - 4 - 44 Buzzard Supplementary Data

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ001	VP4a	30/05/2019	09:51	Buzzard	1	450	0	0	0	450	conifer plantation and improved agricultural grassland; soaring	JC
BZ002	VP4a	30/05/2019	10:10	Buzzard	1	30	0	0	30	0	improved agricultural grassland; flying	JC
BZ003	VP4a	25/06/2019	11:34	Buzzard	1	150	0	0	110	40	improved agricultural grassland, treelines and buildings and artificial surfaces; flying, mobbed, soaring	JC

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ004	VP4a	25/06/2019	14:10	Buzzard	1	150	0	30	90	30	conifer plantation and mixed broadleaved woodland; hunting	JC
BZ005	VP2	26/06/2019	13:10	Buzzard	1	180	0	0	100	80	improved agricultural grassland and treelines; hunting, finally dived	JC
BZ006	VP4	16/07/2019	10:06	Buzzard	1	242	0	0	74	168	improved agricultural grassland; soaring	PW
BZ007	VP4	16/07/2019	10:28	Buzzard	1	75	15	60	0	0	hedgerows, improved agricultural grassland and active quarries and mines; flying across quarry and farmland, mobbed by 2x hc.	PW
BZ008	VP4	16/07/2019	11:06	Buzzard	1	134	0	0	134	0	improved agricultural grassland; soaring, then flew east, southeast.	PW
BZ009	VP4	16/07/2019	12:14	Buzzard	1	70	20	50	0	0	improved agricultural grassland and hedgerows; flew west and down into field or hedge and was lost behind treeline.	PW
BZ010	VP4	16/07/2019	12:30	Buzzard	2	395	0	0	365	30	improved agricultural grassland and hedgerows; soaring, one followed until lost from view in cloud.	PW
BZ011	VP4	16/07/2019	12:45	Buzzard	2	40	0	0	40	0	improved agricultural grassland and hedgerows; soaring over behind treeline. lost from view below treeline.	PW
BZ012	VP4	16/07/2019	12:46	Buzzard	1	40	0	40	0	0	improved agricultural grassland and hedgerows; calling first (12:45:50) then seen flying across gal when lost from view below treeline at 12:47.	PW
BZ013	VP4	16/07/2019	12:52	Buzzard	3	380	0	20	30	330	improved agricultural grassland and hedgerows; 1x bz soaring, joined by 2nd bz at 12:54. at 12:56 one bz began diving and up and diving (6 times) then lost behind the trees. a third bz	PW

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
											was observed as this one dived. then at 12:58 one bz began diving.	
BZ014	VP4	16/07/2019	13:34	Buzzard	1	5	0	0	5	0	improved agricultural grassland and hedgerows; soaring up through trees at 40m, briefly seen.	PW
BZ015	VP4	16/07/2019	13:43	Buzzard	2	570	0	110	290	170	improved agricultural grassland and hedgerows; 2x bz located when heard calling, first flying low among hedgerows and fields. one moved east and looked like it may have landed as it disappeared behind an ash tree at 13:44:50. the other bz was now soaring. at 13:47 2x bz were soaring together, possibly first one re-joining the second or maybe a third bz. disappeared at 13:52:30.	PW
BZ016	VP4	16/07/2019	14:27	Buzzard	1	180	0	0	180	0	improved agricultural grassland and hedgerows; bz flew east and soared a bit before lost from view.	PW
BZ017	VP4	16/07/2019	14:31	Buzzard	3	15	0	0	15	0	improved agricultural grassland and hedgerows; 3x bz soaring low over trees. lost below trees on far side.	PW
BZ018	VP4	16/07/2019	14:36	Buzzard	1	5	0	0	0	5	improved agricultural grassland and hedgerows; seen briefly soaring and flying.	PW
BZ019	VP4	16/07/2019	14:59	Buzzard	3	1200	0	10	730	460	improved agricultural grassland, hedgerows and conifer plantation; 3 bz over wd4/ga1	PW
BZ020	VP4	16/07/2019	15:15	Buzzard	1	240	0	90	150	0	improved agricultural grassland and hedgerows; flew low and east while calling, lost in trees near hill.	PW
BZ021	VP4	16/07/2019	15:19	Buzzard	3	720	0	215	405	100	improved agricultural grassland and hedgerows; at 15:19 2x bz observed over the hill. 15:22:20 a third bz joins	PW

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
											until 15:23:55. 15:25:10 only two bz visible now, one visible flying at 15:28.	
BZ022	VP4	16/07/2019	16:21	Buzzard	1	367	0	7	360	0	improved agricultural grassland and hedgerows; bz soaring and gliding, dropped disappearing in farmland among wll.	PW
BZ023	VP2b	22/07/2019	14:40	Buzzard	1	15	0	0	15	0	improved agricultural grassland and hedgerows; soaring before dropping below horizon when lost from view.	PW
BZ024	VP2b	22/07/2019	16:20	Buzzard	1	15	0	0	15	0	improved agricultural grassland and hedgerows; flying	PW
BZ025	VP2b	22/07/2019	16:42	Buzzard	1	100	0	20	80	0	improved agricultural grassland and hedgerows; soaring in wind over hillside before dropping down from view below the horizon.	PW
BZ026	VP2b	22/07/2019	18:37	Buzzard	1	340	0	0	340	0	improved agricultural grassland and hedgerows; gliding, flying, hovering, hunting.	PW
BZ027	VP2b	22/07/2019	20:16	Buzzard	1	60	0	20	40	0	improved agricultural grassland and hedgerows; soaring and gliding	PW
BZ028	VP4	27/08/2019	17:36	Buzzard	1	7	2	5	0	0	improved agricultural grassland; mobbed	JC
BZ029	VP4	27/08/2019	17:44	Buzzard	1	30	10	20	0	0	improved agricultural grassland, hedgerows and treelines; flying	JC
BZ030	VP2	28/08/2019	16:55	Buzzard	1	25	0	25	0	0	improved agricultural grassland; flying	JC



Map Legend

-  EIAR Site Boundary
-  Turbine Layout
-  500m Radius of Turbines
-  VP Locations
-  Flight Observation



Drawing Title

**Buzzard Vantage Point Survey
Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-37

Scale

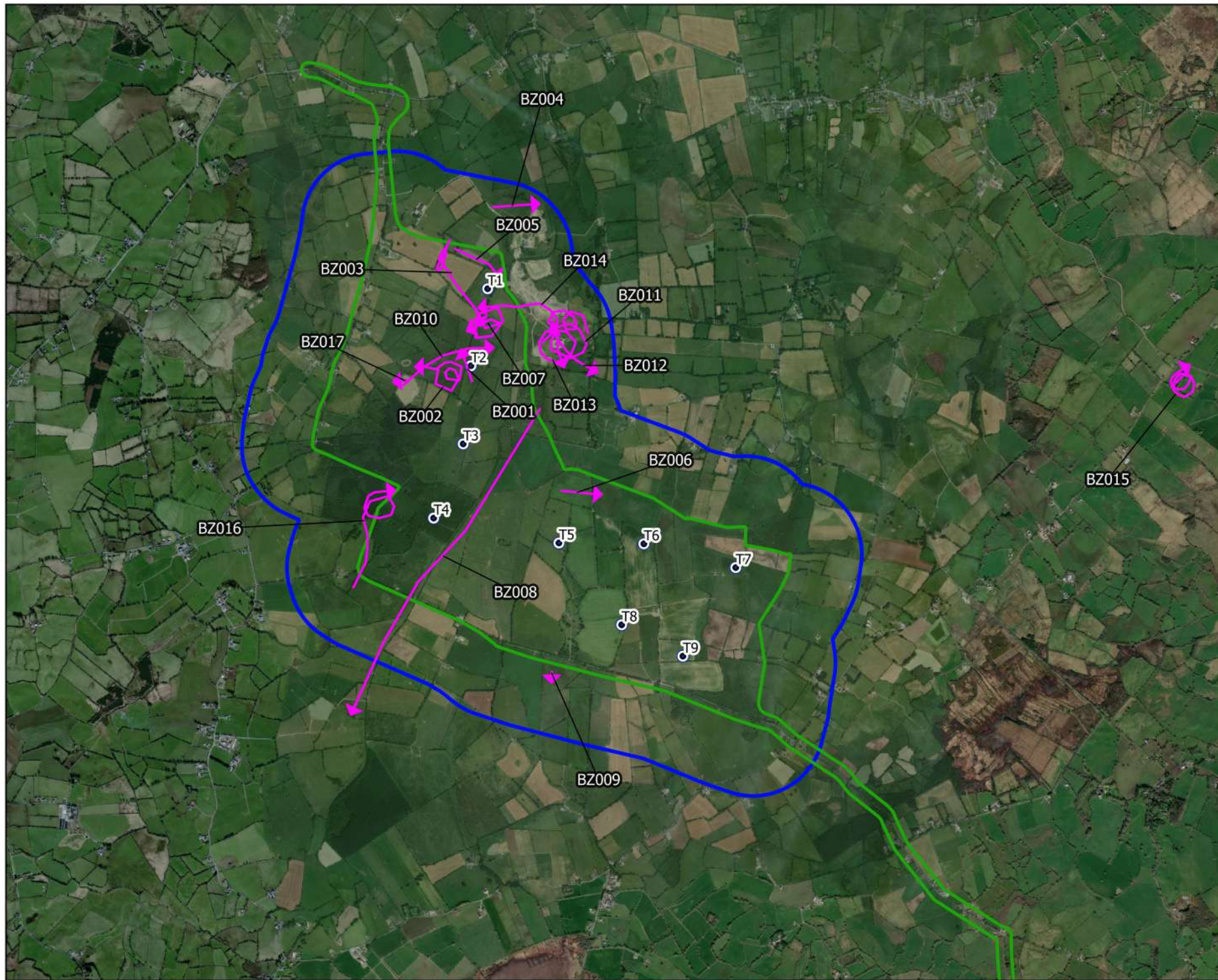
1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title:
Buzzard Winter Walkover Survey Observations

Project Title:
Umma More Renewable Energy Development

Drawn By:
D. Woods

Checked By:
P. Cregg

Project No.:
201050

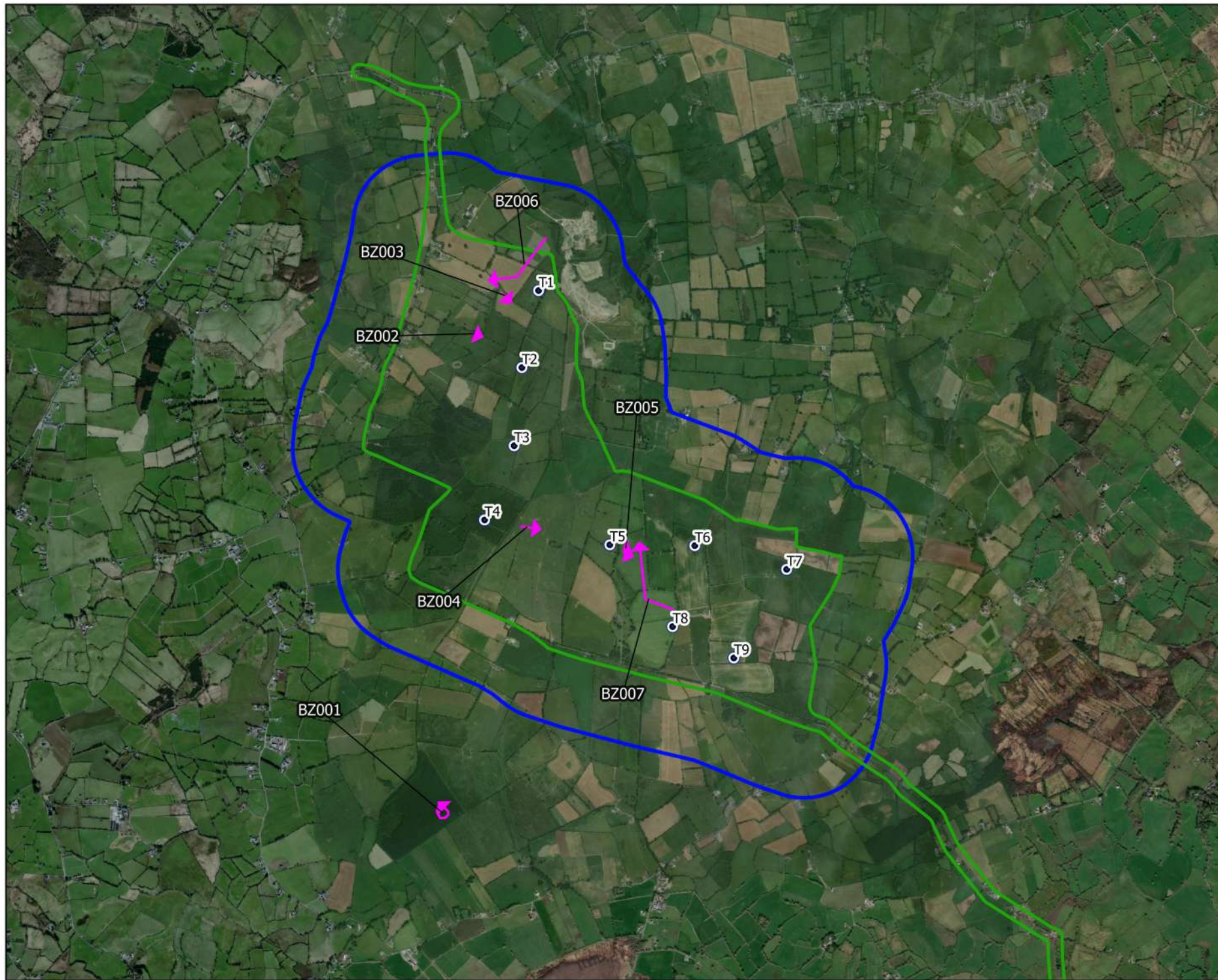
Drawing No.:
Fig. 7-4-38

Scale:
1:35000

Date:
31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title:
Buzzard Breeding Walkover Survey Observations

Project Title:
 Umma More Renewable Energy Development

Drawn By:
D. Woods

Checked By:
P. Cregg

Project No.:
201050

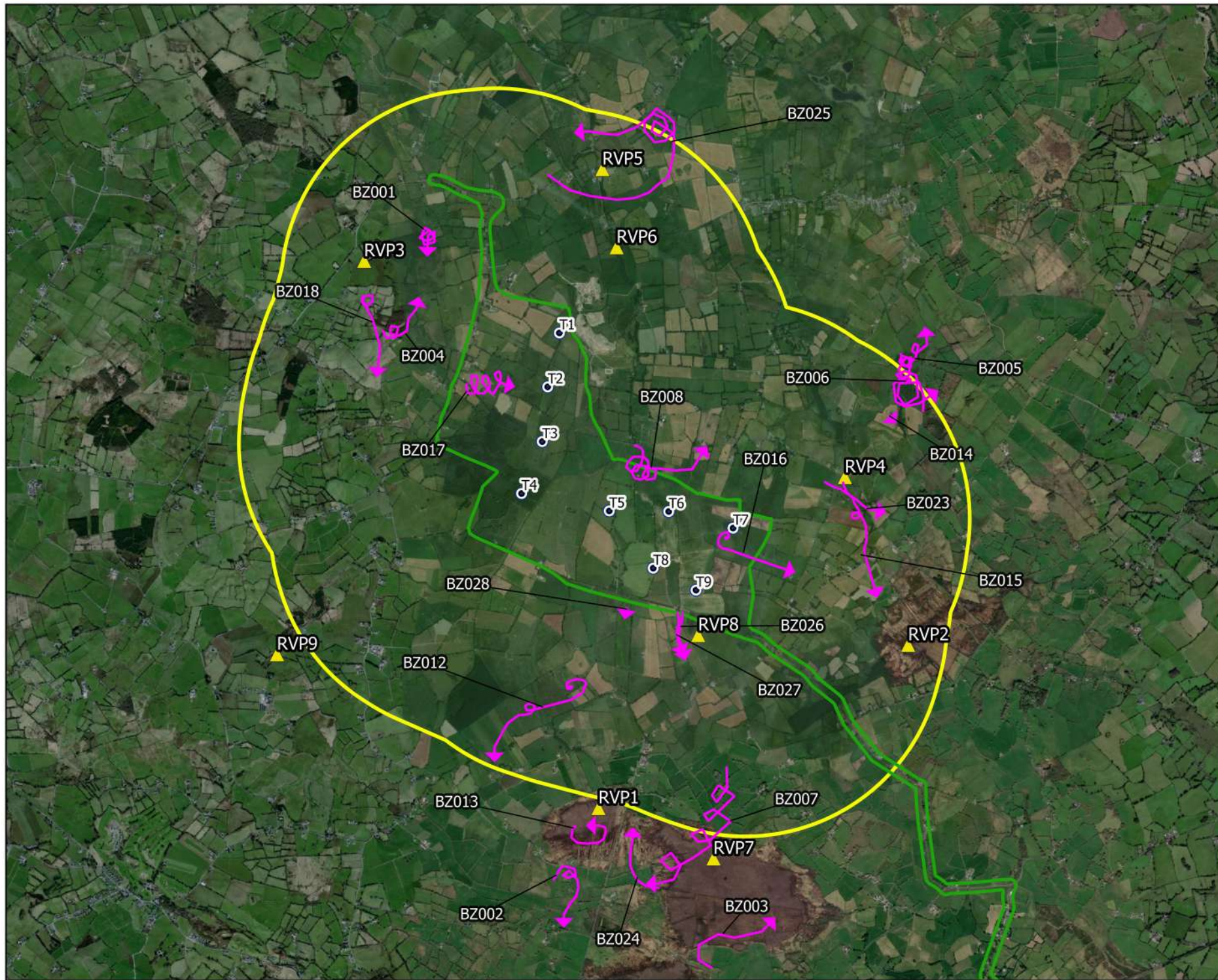
Drawing No.:
Fig. 7-4-39

Scale:
1:35000

Date:
31.01.23



MKO
 Planning and
 Environmental
 Consultants
 Tuam Road, Galway
 Ireland, H91 YW84
 +353 (0)91 235611
 email: info@mkofireland.ie
 Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 2km Survey Radius
- ▲ RVP Locations
- ➔ Flight Observation



Drawing Title

Buzzard Breeding Raptor Survey Observations

Project Title

Umma More Renewable Energy Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-40

Scale

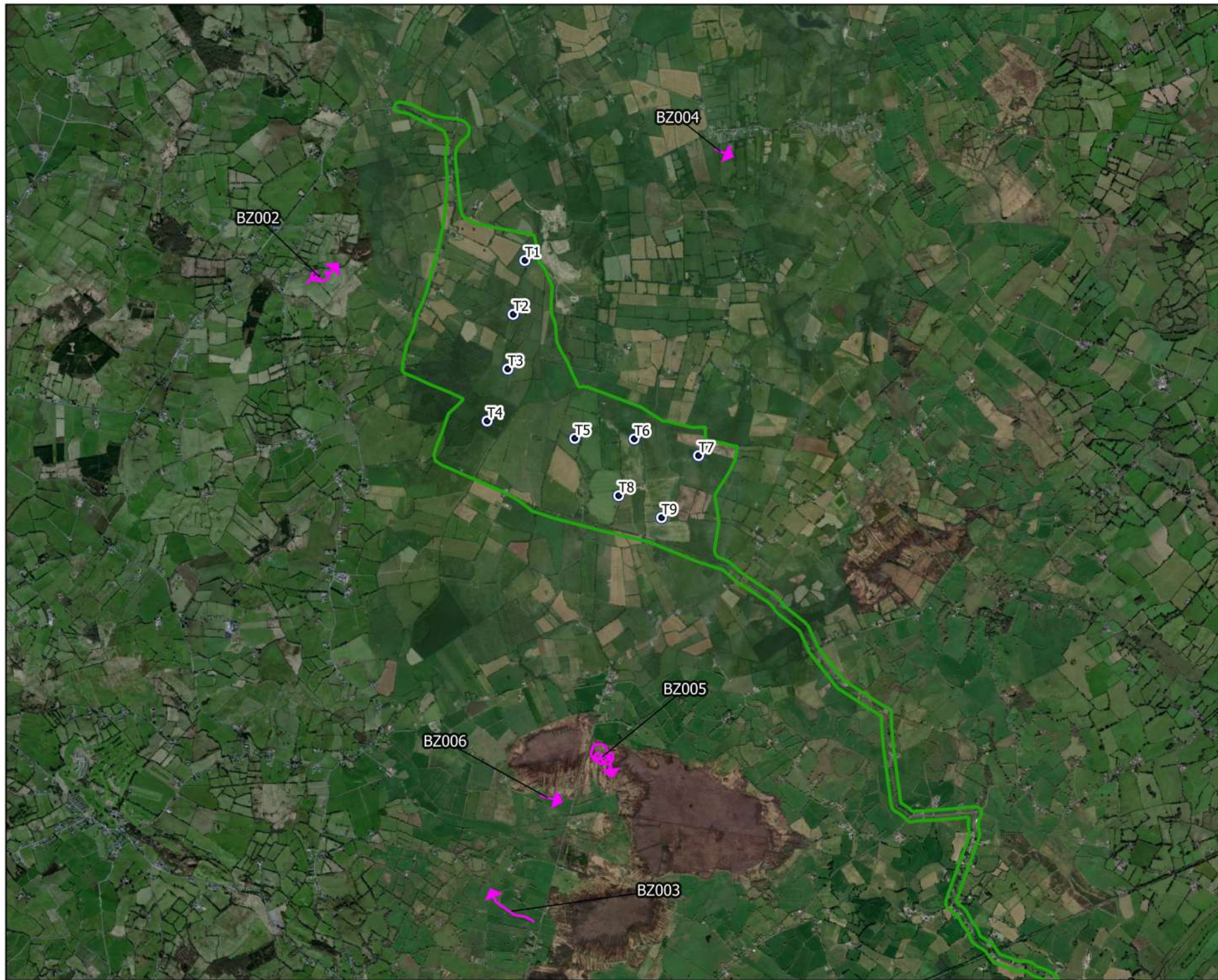
1:50000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuan Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  Flight Observation



Drawing Title

Buzzard Incidental Records

Project Title

Umma More Renewable Energy Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-41

Scale

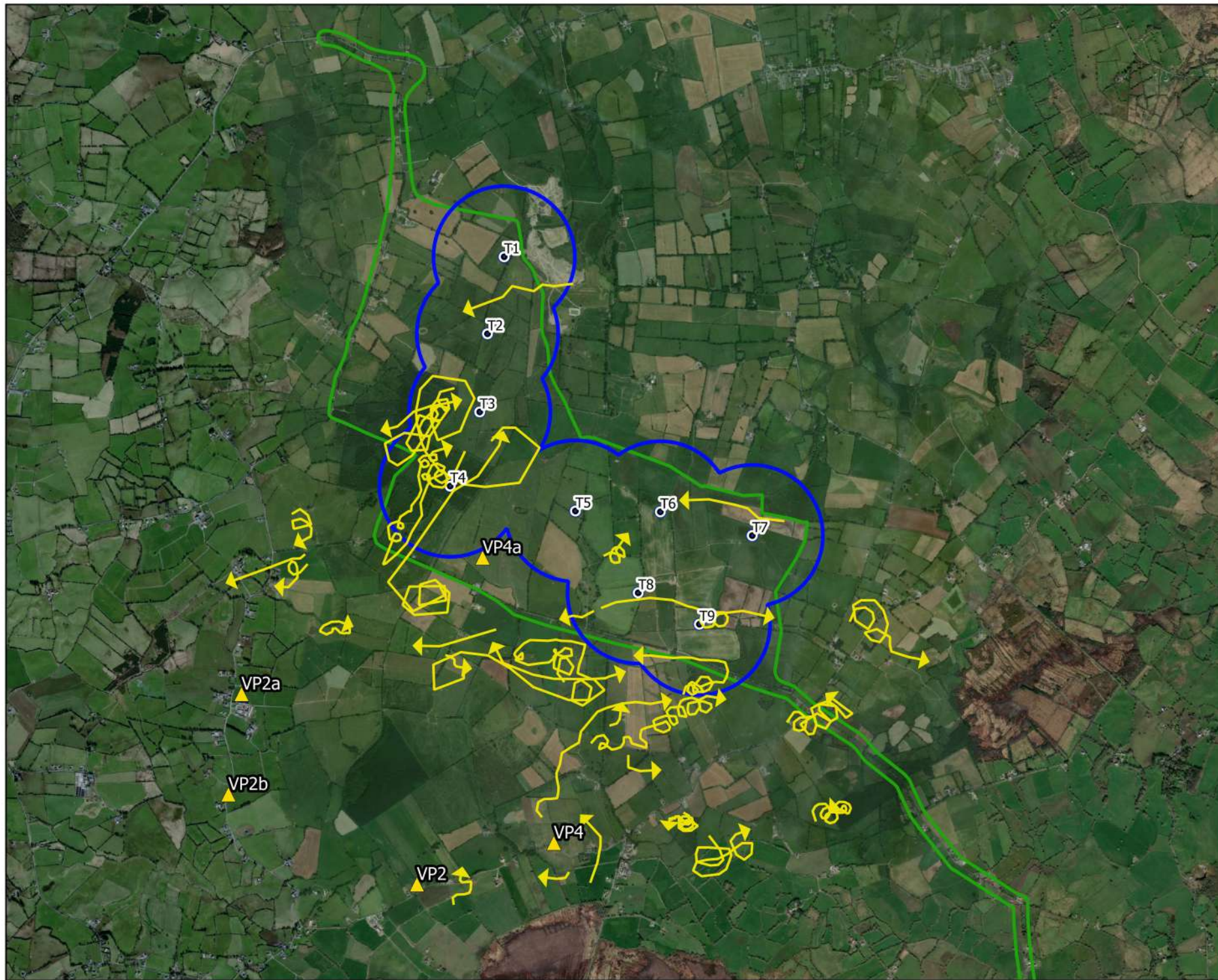
1:50000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- Flight Observation



Drawing Title

Buzzard Supplementary Data

Project Title:
Umma More Renewable Energy Development

Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4-42
Scale	Date
1:35000	09.02.23



MKO
Planning and
Environmental
Consultants
Tuan Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie

13.

SPARROWHAWK

Table 7 - 4 - 45 Sparrowhawk Vantage Point Survey

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
SH001	VP3	17/07/2019	16:53	Sparrowhawk	1	240	140	100	0	0	improved agricultural grassland and hedgerows; hunting goldfinch flock, chased one bird for 10 seconds, missed it and landed in a lone hawthorn tree briefly. it then flew low to hawthorn hedgerow where it perched for 60 seconds. last seen on hedgerow at 16:57 when lost from view.	PW
SH002	VP1	18/07/2019	11:31	Sparrowhawk	1	110	0	0	110	0	improved agricultural grassland and hedgerows; flying and soaring when lost from view as it glided down behind ash down slope.	PW
SH003	VP1	18/07/2019	12:28	Sparrowhawk	1	260	0	0	260	0	improved agricultural grassland and hedgerows; female sh gliding and soaring in wind, gradually moving south along slope, then moved southeast quickly, flying and gliding. it had prey in its talons.	PW
SH004	VP1	11/09/2019	10:27	Sparrowhawk	1	76	0	76	0	0	improved agricultural grassland; soaring / travelling, female	JK
SH005	VP3	13/02/2020	12:39	Sparrowhawk	1	20	0	20	0	0	wet grassland; travelling	PM
SH006	VP1	23/03/2020	11:40	Sparrowhawk	1	300	0	0	300	0	improved agricultural grassland; soaring, soaring in circles/display over area c55m-150m	ED
SH007	VP3	14/05/2020	08:50	Sparrowhawk	1	5	5	0	0	0	tilled land and cultivated land; flew from perch in tree to ground	NG

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
SH008	VP3	05/11/2020	12:21	Sparrowhawk	1	12	12	0	0	0	improved agricultural grassland and hedgerows; very brief sighting. picked up just below vp. travelled east past vp and disappeared in fields behind hedgerow behind vp.	PC
SH009	VP1	15/02/2021	13:11	Sparrowhawk	1	18	0	0	18	0	improved grassland; circling then mobbed by 2 hc. seemed to drop but not sure., hard to track against background as i was looking down on it. hard to judge height of flight.	PDC
SH010	VP1	11/03/2021	07:42	Sparrowhawk	1	15	15	0	0	0	improved agricultural grassland and hedgerows; flew low over fields coming from behind vp. lost behind hedgerow., very brief view as she was below me. hard to spot against muddy background.	PDC

Table 7 - 4 - 46 Sparrowhawk Winter Walkover Survey

Map Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
SH001	27/10/2020	11:35	Sparrowhawk	1	improved agricultural grassland and hedgerows; in flight low over field before entering conifer plantation, in flight low over field before entering conifer plantation (wintering)	PC
SH002	25/02/2021	11:05	Sparrowhawk	1	improved grassland and hedgerows; flew out of hedgerow along road in front of me chasing passerines, male (wintering)	PDC

Table 7 - 4 - 47 Sparrowhawk Breeding Raptor Survey

Map Ref.	BRVP	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
SH001	RVP2	20/04/2019	16:28	Sparrowhawk	1	cutover bog and recently-felled woodland, flying ne across bog at 10m	suitable nesting habitat; possible breeder	JC
SH002	RVP2	20/04/2019	16:55	Sparrowhawk	1	scrub/transitional woodland and cutover bog, flew from willow, birch flying e	suitable nesting habitat; possible breeder	JC
SH003	RVP7	24/05/2019	11:49	Sparrowhawk	1	raised bog and semi-natural woodland, male, flying	suitable nesting habitat; possible breeder	JC
SH004	RVP7	24/05/2019	11:51	Sparrowhawk	1	raised bog and semi-natural woodland, flying	suitable nesting habitat; possible breeder	JC
SH005	RVP7	25/06/2019	15:01	Sparrowhawk	1	bogs, scrub and semi-natural woodland, hunting, male	suitable nesting habitat; possible breeder	JC
SH006	RVP7	25/06/2019	15:13	Sparrowhawk	1	semi-natural woodland, flying, female flying into trees	suitable nesting habitat; possible breeder	JC
SH007	RVP7	25/06/2019	17:10	Sparrowhawk	1	semi-natural woodland and improved agricultural grassland, female flying low allowing edge of woods	suitable nesting habitat; possible breeder	JC
SH008	RVP9	15/07/2019	17:26	Sparrowhawk	1	improved agricultural grassland, male flying	suitable nesting habitat; possible breeder	JC

Table 7 - 4 - 48 Sparrowhawk Incidental Records

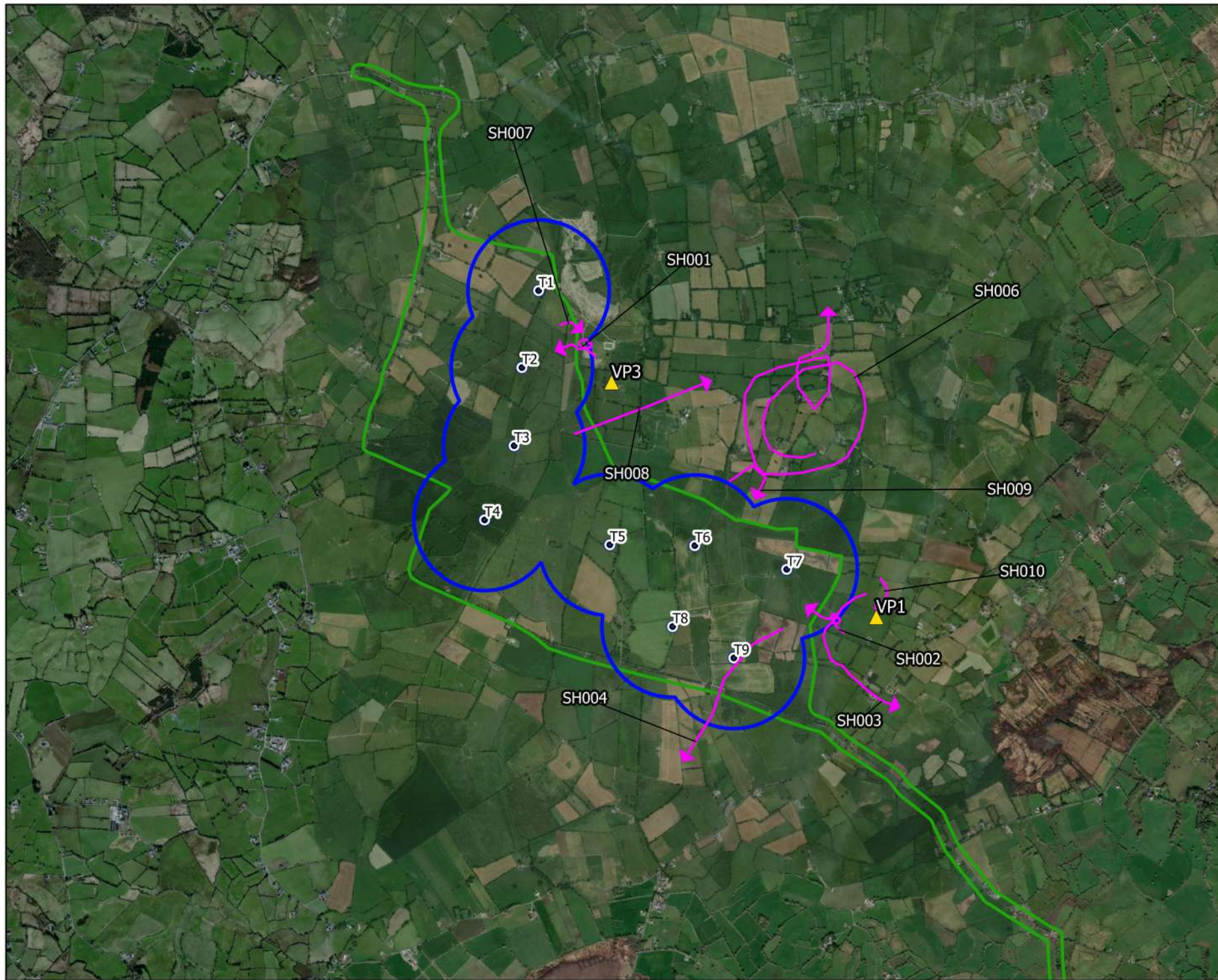
Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
n/a	Vantage Point Survey; VP3	08/10/2020		Sparrowhawk	1	improved agricultural grassland; female behind vp at 14:30, heading north to south. attempted to catch mistle thrush in bush before heading off behind vp, not mapped	PC
n/a	Waterfowl Distribution Survey; Ballymore	23/10/2020		Sparrowhawk	1	improved agricultural grassland; in flight over the road to moate just as you leave ballymore., not mapped	PC
n/a	Waterfowl Distribution Survey; Ballynalone	09/12/2020	11:21	Sparrowhawk	1	improved agricultural grassland; male flew over road, not mapped	PC

Map Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
n/a	Vantage Point Survey; VP3, Mullenmeehan	15/12/2020	08:45	Sparrowhawk	2	improved agricultural grassland; male and female flew across road near mullenmeehan at about 8:45am., not mapped	PC
SH001	Vantage Point Survey; VP3	16/02/2021	13:51	Sparrowhawk	1	improved agricultural grassland; female mobbed and chased off by 2 hc. lost behind vp	PDC
SH002	Waterfowl Distribution Survey; Moyvoughly bog	22/03/2021	11:35	Sparrowhawk	1	improved agricultural grassland; female appeared to be hunting. flushed mixed flock of sg and thrushes. chased by hc into next field.	PDC

Table 7 - 4 - 49 Sparrowhawk Supplementary Data

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
SH001	VP2	26/06/2019	10:47	Sparrowhawk	1	15	0	2	13	0	improved agricultural grassland and treelines; flying	JC
SH002	VP2	26/06/2019	14:35	Sparrowhawk	1	65	5	10	50	0	improved agricultural grassland and treelines; hunting	JC
SH003	VP2	26/06/2019	14:46	Sparrowhawk	1	240	0	0	240	0	improved agricultural grassland and buildings and artificial surfaces; circling	JC
SH004	VP4	16/07/2019	10:36	Sparrowhawk	2	491	0	0	120	371	improved agricultural grassland and hedgerows; first spotted flying and soaring, coming together at least three times, interacting. gradually climbing higher and soaring, when they stopped coming together. lost from view in cloud.	PW
SH005	VP4	16/07/2019	11:55	Sparrowhawk	1	390	0	120	180	90	improved agricultural grassland and hedgerows; flying through trees and over ga1 mobbed by calling swallows. it flew across open farmland climbing	PW

Map Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
											and began soaring south of vp4. it gained height to the west of vp4 and soared north still mobbed by calling swallows before it was lost in the clouds as it soared higher. , adult female	
SH006	VP4	16/07/2019	14:32	Sparrowhawk	1	470	0	50	300	120	improved agricultural grassland and hedgerows; chased by calling swallows. flew across grass fields and hedges gradually gaining height.	PW
SH007	VP2b	22/07/2019	14:20	Sparrowhawk	1	110	0	0	110	0	improved agricultural grassland and hedgerows; soaring	PW
SH008	VP2b	22/07/2019	15:03	Sparrowhawk	1	20	0	18	2	0	improved agricultural grassland, hedgerows and conifer plantation; flying, lost behind trees in w11.	PW
SH009	VP2b	22/07/2019	16:45	Sparrowhawk	1	5	0	0	5	0	improved agricultural grassland and hedgerows; gliding and soaring in the wind, lost behind a tree.	PW
SH010	VP2b	22/07/2019	16:48	Sparrowhawk	1	2	0	0	2	0	improved agricultural grassland and hedgerows; gliding	PW
SH011	VP2	28/08/2019	16:06	Sparrowhawk	1	90	0	90	0	0	improved agricultural grassland; flying	JC
SH012	VP2	28/08/2019	17:00	Sparrowhawk	1	40	0	40	0	0	improved agricultural grassland and conifer plantation; hunting	JC



Map Legend

- EIAR Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ VP Locations
- Flight Observation



Drawing Title:
**Sparrowhawk Vantage Point
Survey Observations**

Project Title:
**Umma More Renewable Energy
Development**

Drawn By	Checked By
D. Woods	P. Cregg
Project No.	Drawing No.
201050	Fig. 7-4-43
Scale	Date
1:35000	31.01.23

MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Survey Radius
- Flight Observation



Drawing Title

**Sparrowhawk Winter Walkover
Survey Observations**

Project Title

Umma More Renewable Energy
Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-44

Scale

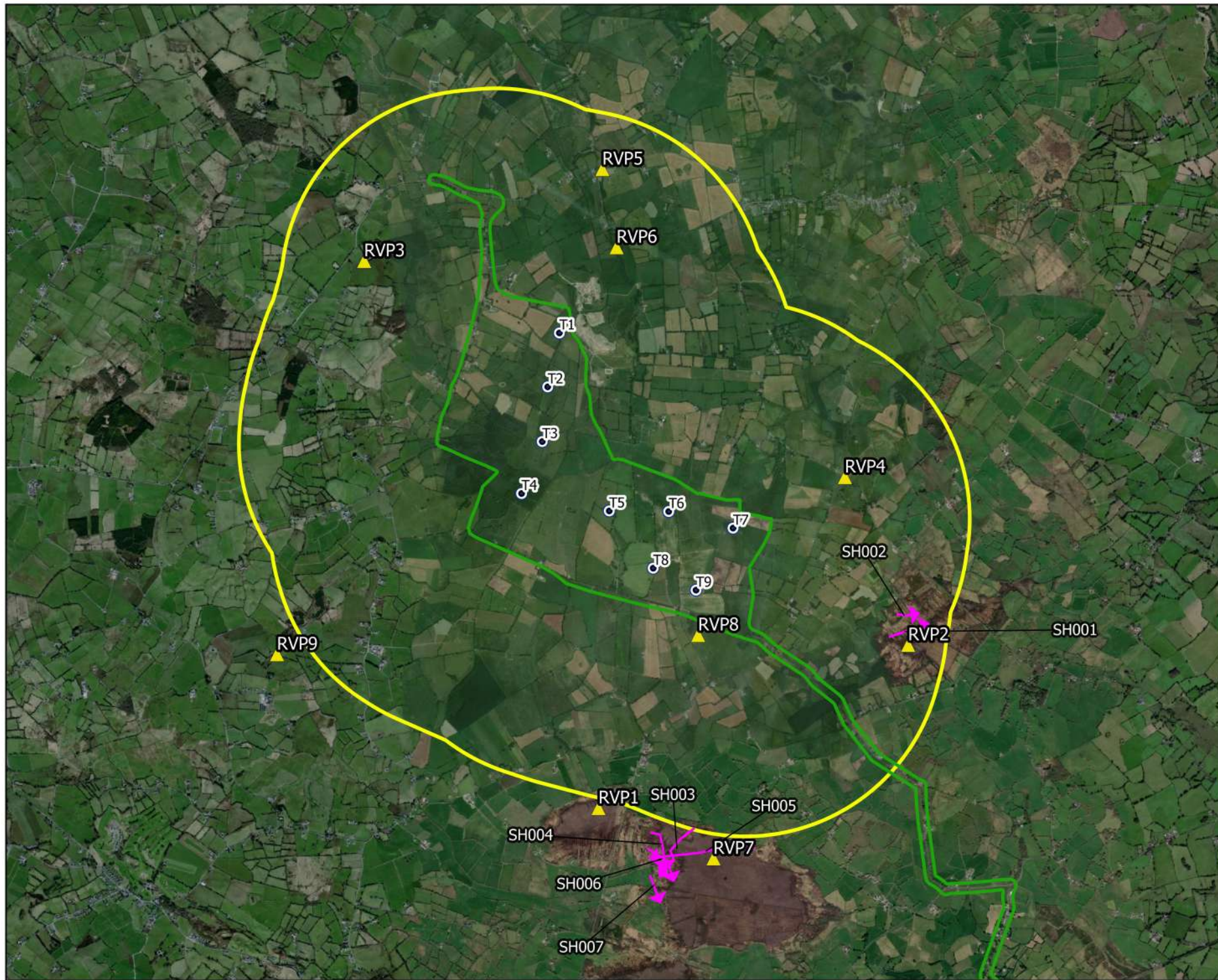
1:35000

Date

31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 2km Survey Radius
- ▲ RVP Locations
- Flight Observation



Drawing Title:
Sparrowhawk Breeding Raptor
Survey Observations

Project Title:
Umma More Renewable Energy
Development

Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 201050	Drawing No.: Fig. 7-4-45
Scale: 1:50000	Date: 31.01.23

MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 VV84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie

Microsoft product screen shots reprinted with permission from Microsoft Corporation



Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  Flight Observation



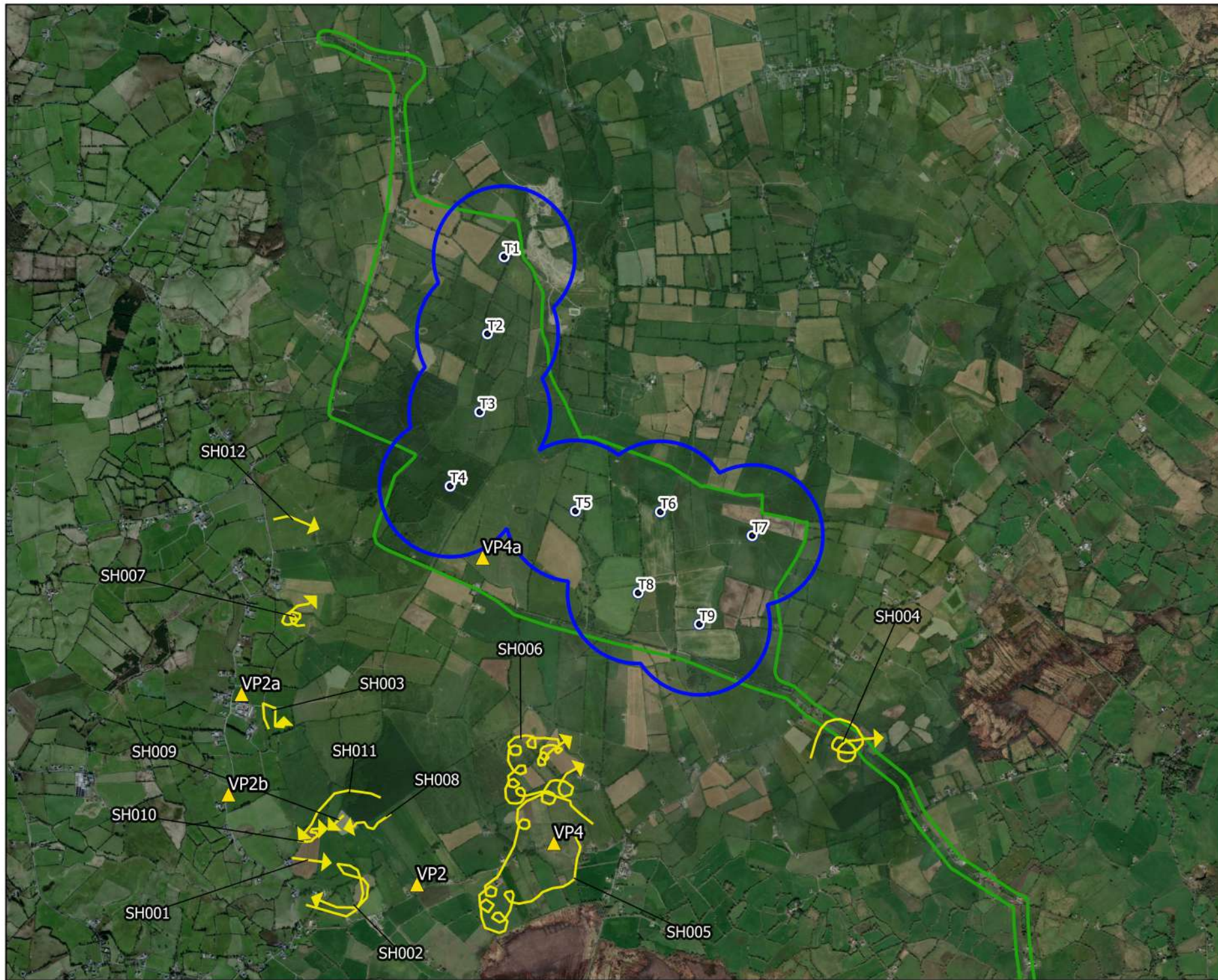
Drawing Title
Sparrowhawk Incidental Records

Project Title
Umma More Renewable Energy Development

Drawn By D. Woods	Checked By P. Cregg
Project No. 201050	Drawing No. Fig. 7-4-46
Scale 1:50000	Date 31.01.23



MKO
Planning and
Environmental
Consultants
Tuam Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
email: info@mkofireland.ie
Website: www.mkofireland.ie



Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- Flight Observation



Drawing Title

Sparrowhawk Supplementary Data

Project Title

Umma More Renewable Energy Development

Drawn By

D. Woods

Checked By

P. Cregg

Project No.

201050

Drawing No.

Fig. 7-4-47

Scale

1:35000

Date

09.02.23



MKO
Planning and
Environmental
Consultants
Tuan Road, Galway
Ireland, H91 YW84
+353 (0)91 235611
enquiries@mkofireland.ie
Website: www.mkofireland.ie



APPENDIX 7-5

COLLISION RISK ASSESSMENT DOCUMENT

Table of Contents

1.	INTRODUCTION	3
2.	METHODOLOGY	4
2.1	The Band Model.....	4
2.2	Modelling Process.....	5
2.3	Turbine specifications	5
2.4	Ornithological Receptors	6
2.5	Calculation Parameters	6
3.	RESULTS AND DISCUSSION	8
4.	BIBLIOGRAPHY	9

1.

INTRODUCTION

This document outlines the methodology used to assess the collision risk for birds at the Proposed Development Site. The collision risk assessment is based on vantage point surveys undertaken at the wind farm study area from April 2019 to March 2021. This represents a 24-month survey period, consisting of two breeding seasons and two winter seasons, which is in full compliance with NatureScot (previously Scottish Natural Heritage) guidance (SNH, 2017). Surveys were undertaken from two fixed vantage points.

Collision risk is calculated using a mathematical model to predict the number of birds that may be killed by collision with moving wind turbine rotor blades. The modelling method used in this collision risk calculation is known as the Band Model (Band *et al.*, 2007) and has been used in a number of studies on bird collision with wind turbines (e.g. Chamberlain *et al.*, 2006; Drewitt and Langston, 2006; Fernley *et al.*, 2006; Madders and Whitfield, 2006). Note that these are theoretical predictions, therefore results must be interpreted with a degree of caution.

Two stages are involved in the Band Model. First, the number of bird transits through the air space swept by the rotor blades of the wind turbines per year is estimated. Then the collision risk for a bird passing through the rotor blades is calculated using a mathematical formula. The product of these provides a theoretical annual collision mortality rate. Finally, a bird avoidance rate is applied to the collision mortality rate to account for birds attempting to avoid collision. This final collision mortality rate informs the assessment of impacts of the wind turbine on birds.

2. METHODOLOGY

2.1 The Band Model

The Band Model is used to predict the number of bird collisions that might be caused by a wind turbine. It uses species-specific information on bird biometrics, flight characteristics and the expected amount of flight activity, along with turbine-specific information on hub height, rotor diameter, pitch and rotational speed. The turbine will be 104m at hub height, with 3 blades of a diameter of 162m, giving a maximum rotor height of 185m and a minimum rotor height 23m. The model makes a number of assumptions on the turbine design and on biometrics of birds:

1. Birds are assumed to be of a simple cruciform shape.
 2. Turbine blades are assumed to have length, depth and pitch angle, but no thickness.
 3. Birds fly through turbines in straight lines.
 4. Bird flight is not affected by the slipstream of the turbine blade.
- Because the model assumes that no action is taken by a bird to avoid collision, it is recognised that the collision risk figures derived are purely theoretical and represent worst case estimates.

Two forms of collision risk modelling are outlined by Band *et al.* (2007): a **“Regular Flight Model”** and the **“Random Flight Model”**. A Regular Flight Model is generally applied to situations where flightlines form a regular pattern. This may occur, for example, when birds are using a wind farm site as a commuting corridor between roosting and feeding grounds or migratory routes, as is often observed in geese and swans. The Random Flight Model generally applied to situations where flightlines form no discernible patterns or routes. This is often observed, for example when raptors are in foraging or hunting flights.

The Regular Flight Model predicts the number of transits through a cross-sectional area of a wind farm which represents the width of the commuting corridor. A “risk window” is identified: a 2-dimensional line the width of a wind farm to a 500m buffer of the turbines, multiplied by the rotor diameter. All commuting flights which pass through this risk window within the rotor swept height (potential collision height; PCH) are included in collision risk modelling. Any regular flights more than 500m from the turbine layout can be excluded from analysis. There are a number of key assumptions and limitations:

- The turbine rotor swept area is 2-dimensional, i.e. there is a single row of turbines in the windfarm. This represents all turbines within the commuting corridor accounted for by a single straight-line.
- Bird activity is spatially explicit.
- Birds in an observed flight only cross the turbine area once and do not pass through the cross-section a second time (or multiple times).
- Habitat and bird activity will remain the same over time and be unchanged during the operational stage of the windfarm.
- All flight activity used in the model occurred within the viewshed area.

The Random Flight Model predicts the number of transits through a wind farm while assuming that all flights within the vantage point viewshed are randomly occurring, i.e. any observed flight could just as easily occur within a wind farm site as outside it. All flights within PCH inside the viewshed are included in the model. There are a number of key assumptions and limitations:

- Bird activity is not spatially explicit, i.e. activity is equal throughout the viewshed area and this is equal to activity in the windfarm area.

- Habitat and bird activity will remain the same over time and be unchanged during the operational stage of the windfarm.
- All flight activity used in the model occurred within the viewshed area calculated at the lowest swept rotor height.

More detail on both the Random and Regular Flight Model calculations are available from SNH: <https://www.nature.scot/wind-farm-impacts-birds-calculating-theoretical-collision-risk-assuming-no-avoiding-action>. In the case of the Proposed Development, eight species recorded in flight in the Wind Farm Site were randomly distributed. Therefore a Random Flight Model was conducted for these species. A Regular Flight Model was not conducted for any species, as no regular flight corridors were evident.

2.2 Modelling Process

The steps used in the Band Model to derive the collision mortality rate for each species observed at a wind farm site are outlined below.

- Stage 1: Estimate the number of bird transits through the air space swept by the rotor blades of the wind turbines. Transits are calculated using either the “Regular” or “Random” flight model (Band *et al.*, 2007), depending on flight distribution and behaviour – for the Proposed Development a Random Flight Model was conducted for all species.
- Stage 2: Calculate the collision risk for an individual bird flying through a rotating turbine blade. Collision risk is calculated using a formula which incorporates the number of bird transits (Stage 1), individual species’ biometrics, individual species’ flight speed and style, and the proposed turbine parameters. This formula is publicly available on the SNH website: <https://www.nature.scot/wind-farm-impacts-birds-calculating-probability-collision>. Biometrics are available from the British Trust of Ornithology (BTO, 2021) and flight speeds are available from Alerstam *et al.* (2007). For species that can both flap and glide, the mean of the collision risk for flapping and for gliding flight is taken.
- The product of the number of birds transits per year multiplied by the collision risk provides an annual collision mortality rate. Note that this is the worst-case scenario for collision mortality, as it assumes that birds flying towards the turbines make no attempt to avoid them.
- To account for birds attempting to avoid collision, an avoidance factor is applied to the annual collision mortality rate. This corrects for the ability of the birds to detect and manoeuvre around the turbines. Avoidance rates are available from SNH (2018). Bird avoidance rates are generally 98-99% or higher for most species, based on empirical evidence, targeted studies and literature reviews, and continue to be updated following further studies of bird behaviour and mortality rates at wind farm sites.

The final annual collision risk corrected for avoidance is a “real-world” estimation of the number of collisions that may occur at a wind farm, based on observed bird activity during the vantage point survey period.

2.3 Turbine specifications

Birds in flight within the viewshed at height bands of 10-25m, 25-175m and >175m above ground level have been included in the collision risk model. The turbine specifications used in the model are available in Table 7-5-1.

Table 7-5-1 Turbine specifications

Wind Farm Component	Scenario Modelled
Turbine model	Vestas V162
Number of turbines	9
Blades per turbine rotor	3
Rotor diameter (m)	162
Rotor radius (m)	81
Hub height (m)	104
Swept height (m)	23-185
Pitch of blade (degrees)	6
Maximum chord (m) (i.e. depth of blade)	4.5
Rotational period (s)	6.74
*Turbine operational time (%)	85

*This operational period of 85% is referenced from a report by the British Wind Energy Association (BWEA) (2007) which identifies the standard operational period of the wind turbines in the UK to be roughly 85%.

2.4

Ornithological Receptors

The species of conservation concern recorded during surveys at the Wind Farm Site were:

- Peregrine Falcon;
- Lapwing;
- Black-headed Gull;
- Mallard;
- Teal;
- Snipe;
- Kestrel;
- Buzzard;
- Sparrowhawk.

A CRM was conducted for each of these species. It is assumed that waterbirds are active for 25% of the night along with daylight hours (as per SNH guidance) and this is accounted for in the model.

2.5

Calculation Parameters

The calculation parameters for the vantage points are outlined in Table 7-5-2. Bird biometrics are presented in Table 7-5-3. Table 7-5-4 presents the model input values for the random model: bird seconds in flight at PCH observed from the vantage points during the relevant survey period. Bird seconds in flight at PCH is calculated by multiplying the number of birds observed per flight by the duration of the flight spent within PCH (PCH = the three height bands 10-25m, 25-175m and >175m).

Table 7-5-2 Survey effort and viewshed coverage

Vantage Point	Visible Area at 25m	Risk Area	Turbines visible	Total Survey Effort
VP1	640.281ha	281.842ha	5	144 hours
VP3	441.215ha	210.555ha	5	144 hours

Table 7 - 5 - 3 Bird biometrics

Species	Body Length(m)	Wingspan(m)	Flight Speed(m/s)
Peregrine Falcon	0.42	1.02	20.7
Lapwing	0.3	0.84	11.9
Black-headed Gull	0.36	1.05	11.9
Mallard	0.58	0.9	20.8
Teal	0.36	0.61	19.7
Snipe	0.26	0.46	17.1
Kestrel	0.34	0.76	10.1
Buzzard	0.54	1.2	13.3
Sparrowhawk	0.33	0.62	10

Table 7 - 5 - 4 Model input values

Species	Model	Period	Input value
Peregrine Falcon	random	All	1,006
Lapwing	random	Winter	206,909
Black-headed Gull	random	Breeding	77,176
Black-headed Gull	random	Winter	262 ¹
Mallard	random	All	1,021
Teal	random	Winter	64
Snipe	random	Winter	464
Kestrel	random	All	6,253
Buzzard	random	All	15,150
Sparrowhawk	random	All	884

The avoidance rates applied to the collision risk were: 98% for peregrine, merlin, lapwing, black-headed gull, mallard, teal, snipe, buzzard and sparrowhawk; and 95% for kestrel.

¹ Note: Black-headed gull flights BH006 - BH010 were omitted from the CRM as they were predictably associated/concentrated in an area of habitat over 500m from the nearest turbine on a single day, and therefore not random in nature.

3.

RESULTS AND DISCUSSION

The predicted number of transits per year and the collision risk is presented in Table 7-5-5, along with the final predicted number of collisions per year. Note that for birds that both flap and glide, the average collision risk percentage between flapping and gliding is taken.

Table 7 – 5 – 5 Results of CRM

Species	Survey Period	Model	Transits	Collision Risk			Collision Rate			Estimated Collisions Over Lifetime of Wind Farm	One Bird Collision
				flapping	gliding	overall	without avoidance	avoidance factor	with avoidance		
Peregrine Falcon	All	random	161.6	4.6%	4.33%	4.46%	7.21	98%	0.144	4.33 birds	7 years
Lapwing	Winter	random	16446.7	4.64%	no gliding flight	4.64%	763.5	98%	15.27	458.1 birds	<1 year
Black-headed Gull	Breeding	random	9684.6	4.93%	4.74%	4.83%	467.85	98%	9.357	280.71 birds	<1 year
Black-headed Gull	Winter	random	25.4	4.93%	4.74%	4.83%	1.23	98%	0.025	0.74 birds	41 years
Mallard	All	random	180.6	4.77%	no gliding flight	4.77%	8.61	98%	0.172	5.17 birds	6 years
Teal	Winter	random	10.3	4.28%	no gliding flight	4.28%	0.44	98%	0.009	0.26 birds	114 years
Snipe	Winter	random	57.5	4.1%	no gliding flight	4.1%	2.36	98%	0.047	1.41 birds	21 years
Kestrel	All	random	453.8	4.94%	4.85%	4.89%	22.2	95%	1.11	33.3 birds	1 year
Buzzard	All	random	1477.1	5.38%	5.18%	5.28%	77.97	98%	1.559	46.78 birds	1 year
Sparrowhawk	All	random	51.7	4.87%	4.81%	4.84%	2.5	98%	0.05	1.5 birds	20 years

4.

BIBLIOGRAPHY

Alerstam, T., Rosen M., Backman J., G P., Ericson P. and Hellgren O. (2007). Flight Speeds among Bird Species: Allometric and Phylogenetic Effects. *PLoS Biology*, 5: 1656-1662.

Band, W., Madders, M. and Whitfield, D. (2007). 'Developing Field and Analytical Methods to Assess Avian Collision Risk at Wind Farms', in de Lucas, M., Janss, G. and Ferrer, M. (eds) *Birds and Wind Farms: Risk Assessment and Mitigation*. Madrid: Quercus/Libreria Linneo.

BTO (2021) BirdFacts. Available at <https://www.bto.org/about-birds/birdfacts> (accessed 10/08/2021).

Chamberlain, D.E., Rehfisch, M.R., Fox, A.D., Desholm, M. and Anthony, S.J. (2006). The effect of avoidance rates on bird mortality predictions made by wind turbine collision risk models. *Ibis*, 148: 198-202.

Drewitt, A. and Langston, R. (2006). Assessing the impacts of wind farms on birds. *Ibis*, 148: 29-42.

Fernley, J., Lowther, S. and Whitfield P. (2006). *A review of goose collisions at operating wind farms and estimation of the goose avoidance rate*. Unpublished report by West Coast Energy, Hyder Consulting and Natural Research, UK.

Madders, M. and Whitfield, P.D. (2006). Upland raptors and the assessment of wind farm impacts. *Ibis*, 148: 43-56.

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland.

SNH (2018). Avoidance rates for the onshore SNH wind farm collision risk model. Scottish Natural Heritage, Inverness, Scotland. Available at: <https://www.nature.scot/sites/default/files/2018-09/Wind%20farm%20impacts%20on%20birds%20-%20Use%20of%20Avoidance%20Rates%20in%20the%20SNH%20Wind%20Farm%20Collision%20Risk%20Model.pdf> (accessed 10/08/2021)



APPENDIX 7-6

BIRD MONITORING PROGRAMME

Table of Contents

1.	INTRODUCTION	2
2.	BIRD MONITORING.....	3
2.1	Key Ornithological Receptors.....	3
2.2	Pre-Construction Surveys	3
2.3	Operational Phase Monitoring.....	4
2.3.1	Vantage Point Surveys	4
2.3.2	Breeding Walkover Surveys	4
2.3.3	Collision Monitoring	4
2.3.4	Summary	5
2.4	Decommissioning Surveys	6
2.5	Reporting.....	6
3.	BIBLIOGRAPHY	7

1.

INTRODUCTION

This Bird Monitoring Programme has been prepared by MKO for the proposed Umma More Renewable Energy Development, Co. Westmeath. It provides a timeframe and monitoring schedule for the bird population in the Wind Farm area during the operational phase of the Proposed Development, informed by surveys undertaken to date. Bird surveys were undertaken from April 2019 to March 2021 inclusive, encompassing two breeding and two winter seasons, along with autumn and spring passage, in line with NatureScot (formerly Scottish Natural Heritage) guidance on recommended bird survey methods to inform impact assessment for onshore wind energy developments (SNH, 2017). Key ornithological receptors (KORs) were identified based on these surveys.

The objectives of this Bird Monitoring Programme are:

- To ensure any required pre-construction/ pre-decommissioning phase surveys are scheduled to avoid impacts on KORs and other birds of conservation concern.
- To record birds using the Wind Farm Site and their interaction with operating turbines during the operational phase of the Proposed Development.
- To monitor any short-term and long-term effects on bird populations in the Wind Farm Site, with a particular emphasis on birds of high conservation concern (birds listed on Annex I of the EU Birds Directive or on the Red List of Birds of Conservation Concern in Ireland, birds that are a Special Conservation Interest [SCI] of nearby Special Protection Areas [SPAs] and raptors and other species sensitive to wind energy developments).
- To undertake collision monitoring and carcass searches for potential bird fatalities as a result of a collision with turbine blades.
- To report on the findings of operational monitoring at the end of each monitoring year.

2.

BIRD MONITORING

2.1

Key Ornithological Receptors

Table 7-6-1 lists the KORs recorded during pre-planning surveys conducted from April 2019 to March 2021 inclusive. These species form the basis of the Bird Monitoring Programme.

Table 7 – 6 – 1 Key ornithological receptors

Species	Scientific Name	Conservation Status
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	SCI of Middle Shannon Callows SPA
Buzzard	<i>Buteo buteo</i>	Raptor
Kestrel	<i>Falco tinnunculus</i>	Red List & Raptor
Lapwing	<i>Vanellus vanellus</i>	Red List & SCI of Lough Ree SPA and Middle Shannon Callows SPA
Mallard	<i>Anas platyrhynchos</i>	SCI of Lough Ree SPA
Merlin	<i>Falco columbarius</i>	Annex I & Raptor
Peregrine Falcon	<i>Falco peregrinus</i>	Annex I & Raptor
Snipe	<i>Gallinago gallinago</i>	Red List
Sparrowhawk	<i>Accipiter nisus</i>	Raptor
Teal	<i>Anas crecca</i>	SCI of Lough Ree SPA

2.2

Pre-Construction Surveys

Pre-construction surveys will be undertaken prior to the initiation of construction works at the Wind Farm Site. Pre-construction surveys comprise a thorough walkover survey to a 500m radius of the development footprint and/or all works areas, where access allows.

If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase respectively. If it is found to be active during the construction phase, no works shall be undertaken within a species-specific disturbance buffer in line with industry best practice (e.g. Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007). No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied. All site staff and sub-contractors will be made aware of any restrictions to be imposed by means of a toolbox talk and a map of the 'no-work zone'. The restricted area will also be marked off to alert all personnel on site to the suspension of works within that area.

2.3

Operational Phase Monitoring

Operational monitoring will be undertaken in Years 1, 2, 3, 5, 10 and 15 of the lifetime of the Proposed Development, following SNH (2009) guidance. Survey methodology will be similar to methods employed for baseline Environmental Impact Assessment Report surveys, which will allow a comparison of data to be made. The operational monitoring surveys that will be undertaken at the Proposed Development are:

- Vantage point surveys;
- Breeding walkover surveys;
- Collision monitoring.

2.3.1

Vantage Point Surveys

Vantage point surveys will be undertaken during each monitoring year to record flight activity around the turbines. Vantage point survey methodology will follow guidelines issued by SNH (2009; 2017): the pre-planning vantage point locations (VP1 & VP3) will be visited once per month for two 3-hour watches separated by a minimum 30 minute break, amounting to 36 hours in the breeding season and 36 hours in the winter season at each vantage point.

Surveys will be timed to provide a spread over the full daylight period, including dawn and dusk watches to coincide with the highest periods of bird activity from September to May inclusive. The flight activity of target species (all waterbirds, raptors, groundfowl, and protected near-passerines and passerines¹) will be recorded from a scanning arc of 180° and a 2km radius and assigned to height bands based on the rotor swept height of the turbines. Behavioural categories for bird interactions with operational turbines will be in line with terminology by Meredith *et al.* (2002). Along with target species, the presence of all additional (non-target) species observed should be recorded to inform bird usage of the area.

2.3.2

Breeding Walkover Surveys

Breeding walkover surveys will be undertaken during each monitoring year to determine possible, probable or confirmed breeding bird activity. Transects will be conducted following methodology based on Brown and Shepherd (1993) and Calladine *et al.* (2009), combined with Common Bird Census methods (British Trust for Ornithology, 2021) for dense habitat. Surveys should be conducted in daylight hours (08:00-18:00), with one visit per month during the core breeding season April to July inclusive.

Transect routes should be walked across different habitat complexes to a 500m radius of the turbines, where access allows, and aim to follow the same routes that were used during pre-planning surveys. The surveyor should regularly scan for target species (all waterbirds, raptors, groundfowl, and protected near-passerines and passerines). Notes should be recorded on nesting and territorial behaviour and breeding signs using standard British Trust of Ornithology codes. Non-breeding behaviour such as birds flying over the site should also be recorded. Along with target species, the presence of all additional (non-target) species observed should be recorded to inform bird usage of the area.

2.3.3

Collision Monitoring

Collision monitoring will be undertaken during each monitoring year to monitor bird fatalities due to collisions with turbines at the Proposed Development site. Monitoring will follow industry best practice,

¹ Protection comprises (i) species listed on Annex I of the EU Birds Directive (Directive 2009/147/EC) and (ii) species listed as Red on the Birds of Conservation Concern in Ireland

such as SNH (2009) and Northern Ireland Environment Agency guidelines and search methods adopted by Duffy and Steward (2008).

The Wind Farm Site will be visited once per month. During each visit, the base of each operating turbine will be searched for bird carcasses. The area to be searched will be based on the turbine size and surrounding landscape. A specially trained dog in the detection of bird carcasses and qualified handler should be used where possible to locate carcasses. If a bird carcass is found, the following details will be recorded: GPS location of each bird carcass, photographic record, carcass condition using the following condition categories, as per Johnson *et al.* (2003):

- **Intact** - a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- **Scavenged** - an entire carcass which shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location such as wings, legs, skeletal remains or pieces of skin.
- **Feather Spot** - ten or more feathers at one location indicating predation or scavenging. If only feathers are found, 10 or more total feathers or two or more primaries must be discovered to consider the observation a casualty..

Carcass removal trials and searcher efficiency trials will be undertaken to account for the ability of the dog team to find bird carcasses and the likelihood of scavenging of corpses by animals. This is done to ensure a more accurate estimation of the total number of collision victims. During carcass removal trials, a carcass is placed in a study area periodically and is monitored for a set number of days or until scavengers remove the carcass. A determination on carcass removal is made when no body parts containing flesh or bone or >10 disarticulated feathers can be found. During searcher efficiency trials, a number of carcasses are placed in a study area by one worker, then searched for by another worker with the dog. These may be conducted on the same day as surveys are carried out to avoid flooding the area with carcasses and increasing scavenger activity. The result of these trials provide a correction factor that can be applied to the results of the carcass searches.

2.3.4 Summary

Table 7-6-2 summarises the proposed bird monitoring schedule for each operational monitoring year.

Table 7 – 6 – 2 Proposed operational monitoring schedule

Survey	Year	Period	Visits	Survey Method
Vantage Point Survey	Year 1, 2, 3, 5, 10 and 15	All months	1 visit per month to all vantage points (VP1 & VP3)	6 hour vantage point watch, including dawn and dusk surveys between September and May, and daytime surveys between June and August.
Breeding Walkover Survey	Year 1, 2, 3, 5, 10 and 15	April - July	1 visit per month	Transects.
Collision Monitoring	Year 1, 2, 3, 5, 10 and 15	All months	1 visit per month to survey all turbine bases	Targeted carcass searches at turbine bases with trained dog.

2.4

Decommissioning Surveys

Pre-decommissioning monitoring surveys will be undertaken prior to works associated with decommissioning at the Wind Farm Site. The survey will include a thorough walkover survey to a 500m radius of the development footprint and all works areas, where access allows. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the decommissioning phase. If it is found to be active during the decommissioning phase, no works shall be undertaken within a disturbance buffer in line with industry best practice (e.g. Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007). No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.

2.5

Reporting

A report summarising the findings of bird monitoring surveys will be submitted to the Planning Authority at the end of each operational monitoring year (Year 1, 2, 3, 5, 10 and 15). The report will provide the results of the surveys (vantage point surveys, breeding walkover surveys and collision monitoring) and discuss potential impacts on birds (particularly KORs) and any recommendations that may inform further monitoring measures during the operational phase of the Proposed Development.

3.

BIBLIOGRAPHY

Duffy, K. and Steward, M. (2008). Turbine search methods and carcass removal trials at the Braes of Doune windfarm. Natural Research Information Note 4, Natural Research Ltd, Banchory, UK.

Forestry Commission Scotland (2006). Forest operations and birds in Scottish forests – the law and good practice. Forestry Commission Scotland, Scotland.

Ruddock, M. and Whitfield, D. P. (2007). A review of disturbance distances in selected bird species. Natural Research, Banchory, UK.

SNH (2009). Monitoring the impact of onshore wind farms on birds. Scottish Natural Heritage, Inverness, Scotland.

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland



APPENDIX 7-7

CONFIDENTIAL APPENDIX

Only issued to An Bord Pleanála
and Westmeath County Council