



DESIGNING AND DELIVERING  
A SUSTAINABLE FUTURE

## APPENDIX 10

### ORNITHOLOGY

Appendix 10.1- Species List

Appendix 10.2 - Vantage Point Surveys

Appendix 10.3 - Summary Data

Appendix 10.4.i - VP Data and Maps

Appendix 10.4.ii - Walkover Surveys Data and Maps

Appendix 10.4.iii - Sensitive Species Survey Confidential Information

Internal Use Only & Walkover Surveys Data without Maps

Appendix 10.5 - Collision Risk Model



## APPENDIX 10.1

### Species List





## Appendix I0-1 Bird Species Lists

**Table 1: Target species identified for the proposed Derrynadarragh Wind Farm site (includes some species not record during field surveys).**

| Target Species                               | Conservation Status                      |
|----------------------------------------------|------------------------------------------|
| *Barn Owl ( <i>Tyto alba</i> )               | Red Listed                               |
| *Bewick's Swan ( <i>Cygnus columbianus</i> ) | Red Listed                               |
| Buzzard ( <i>Buteo buteo</i> )               | Green Listed                             |
| *Redshank ( <i>Tringa totanus</i> )          | Red Listed                               |
| *Cormorant ( <i>Phalacrocorax carbo</i> )    | Amber Listed                             |
| Curlew ( <i>Numenius arquata</i> )           | Red Listed                               |
| *Dunlin ( <i>Calidris alpina</i> )           | Red Listed; Annex I EU Birds Directive   |
| Golden Plover ( <i>Pluvialis apricaria</i> ) | Red Listed; Annex I                      |
| Grey Heron ( <i>Ardea cinerea</i> )          | Green Listed                             |
| *Grey Partridge ( <i>Perdix perdix</i> )     | Red Listed                               |
| Grey Wagtail ( <i>Motacilla cinerea</i> )    | Red Listed                               |
| Hen Harrier ( <i>Circus cyaneus</i> )        | Amber Listed; Annex I EU Birds Directive |
| Kestrel ( <i>Falco tinnunculus</i> )         | Red Listed                               |
| Kingfisher ( <i>Alcedo atthis</i> )          | Amber Listed; Annex I EU Birds Directive |
| Lapwing ( <i>Vanellus vanellus</i> )         | Red Listed                               |
| *Little Egret ( <i>Egretta garzetta</i> )    | Green Listed; Annex I EU Birds Directive |
| Mallard ( <i>Anas platyrhynchos</i> )        | Amber Listed                             |
| Meadow Pipit ( <i>Anthus pratensis</i> )     | Red Listed                               |
| Merlin ( <i>Falco columbarius</i> )          | Amber Listed; Annex I EU Birds Directive |
| Peregrine Falcon ( <i>Falco peregrinus</i> ) | Green Listed; Annex I EU Birds Directive |
| *Red Grouse ( <i>Lagopus lagopus</i> )       | Red Listed                               |
| Redwing ( <i>Turdus iliacus</i> )            | Red Listed                               |
| Snipe ( <i>Gallinago gallinago</i> )         | Red Listed                               |
| Sparrowhawk ( <i>Accipiter nisus</i> )       | Green Listed                             |
| Swift ( <i>Apus apus</i> )                   | Red Listed                               |
| Whooper Swan ( <i>Cygnus cygnus</i> )        | Amber Listed; Annex I EU Birds Directive |
| Woodcock ( <i>Scolopax rusticola</i> )       | Red Listed                               |
| Yellowhammer ( <i>Emberiza citrinella</i> )  | Red Listed                               |

\*Species not observed during field surveys undertaken within and surrounding wind farm site.

**Table 2: Species recorded during surveys undertaken at Dereenadarragh Wind Farm from October 2021 to September 2023 within Study Area.**

| Target Species                               | Conservation Status                      |
|----------------------------------------------|------------------------------------------|
| Buzzard ( <i>Buteo buteo</i> )               | Green Listed                             |
| Redshank ( <i>Tringa totanus</i> )           | Red Listed                               |
| Cormorant ( <i>Phalacrocorax carbo</i> )     | Amber Listed                             |
| Curlew ( <i>Numenius arquata</i> )           | Red Listed                               |
| Golden Plover ( <i>Pluvialis apricaria</i> ) | Red Listed; Annex I                      |
| Grey Heron ( <i>Ardea cinerea</i> )          | Green Listed                             |
| Grey Wagtail ( <i>Motacilla cinerea</i> )    | Red Listed                               |
| Hen Harrier ( <i>Circus cyaneus</i> )        | Amber Listed; Annex I EU Birds Directive |
| Kestrel ( <i>Falco tinnunculus</i> )         | Red Listed                               |
| Kingfisher ( <i>Alcedo atthis</i> )          | Amber Listed; Annex I EU Birds Directive |
| Lapwing ( <i>Vanellus vanellus</i> )         | Red Listed                               |
| Little Egret ( <i>Egretta garzetta</i> )     | Green Listed; Annex I EU Birds Directive |
| Mallard ( <i>Anas platyrhynchos</i> )        | Amber Listed                             |
| Meadow Pipit ( <i>Anthus pratensis</i> )     | Red Listed                               |
| Merlin ( <i>Falco columbarius</i> )          | Amber Listed; Annex I EU Birds Directive |
| Peregrine Falcon ( <i>Falco peregrinus</i> ) | Green Listed; Annex I EU Birds Directive |
| Red Grouse ( <i>Lagopus lagopus</i> )        | Red Listed                               |
| Redwing ( <i>Turdus iliacus</i> )            | Red Listed                               |
| Snipe ( <i>Gallinago gallinago</i> )         | Red Listed                               |
| Sparrowhawk ( <i>Accipiter nisus</i> )       | Green Listed                             |
| Swift ( <i>Apus apus</i> )                   | Red Listed                               |
| Whooper Swan ( <i>Cygnus cygnus</i> )        | Amber Listed; Annex I EU Birds Directive |
| Woodcock ( <i>Scolopax rusticola</i> )       | Red Listed                               |
| Yellowhammer ( <i>Emberiza citrinella</i> )  | Red Listed                               |

**Table 3: Additional species recorded during surveys**

| Species                                                | Conservation Status | Note                            |
|--------------------------------------------------------|---------------------|---------------------------------|
| Cuckoo ( <i>Cuculus canorus</i> )                      | Green Listed        | Heard off-site, May 2022        |
| Grater Spotted Woodpecker ( <i>Dendrocopus major</i> ) | Green Listed        | Heard off-site, May 2022        |
| Skylark ( <i>Alauda arvensis</i> )                     | Amber Listed        |                                 |
| Cattle Egret ( <i>Bubulcus ibis</i> )                  | Green Listed        | Seen off-site during VP survey. |
| Linnet ( <i>Linaria cannabina</i> )                    | Amber Listed        |                                 |
| Lesser Black-backed Gull ( <i>Larus fuscus</i> )       | Amber Listed        | Seen off-site during VP survey. |

## APPENDIX 10.2

### Vantage Point Surveys



## Appendix 10-2

Ornithology Survey details at Derrynadarragh Wind Farm to inform Environmental Impact Assessment

Table 1: Details of Vantage Point Surveys undertaken at Derrynadarragh Wind Farm October 2021 to September 2023.

| Date       | Survey type          | Survey Location | Duration (hrs) | Start time | End time | Weather                                  | Surveyor | Comments (general) |
|------------|----------------------|-----------------|----------------|------------|----------|------------------------------------------|----------|--------------------|
| 11/10/2021 | Vantage Point Survey | VP2             | 3              | 08:00      | 11:00    | Dry, moderate visibility, WNW wind F2    | GW       |                    |
| 11/10/2021 | Vantage Point Survey | VP1             | 3              | 14:30      | 17:30    | Dry, good visibility, no wind            | GW       |                    |
| 12/10/2021 | Vantage Point Survey | VP1             | 3              | 08:00      | 11:00    | Dry, good visibility, no wind            | GW       |                    |
| 12/10/2021 | Vantage Point Survey | VP2             | 3              | 11:30      | 14:30    | Dry, good visibility, no wind            | GW       |                    |
| 08/11/2021 | Vantage Point Survey | VP2             | 3              | 07:30      | 10:30    | Dry, good visibility, SSE wind F2        | GW       |                    |
| 08/11/2021 | Vantage Point Survey | VP1             | 3              | 13:30      | 16:30    | Dry, good visibility, SSW wind F4        | GW       |                    |
| 09/11/2021 | Vantage Point Survey | VP1             | 3              | 07:30      | 10:30    | Dry, good visibility, W wind F2          | GW       |                    |
| 09/11/2021 | Vantage Point Survey | VP2             | 3              | 13:00      | 16:00    | Dry, excellent visibility, W wind F1     | GW       |                    |
| 02/12/2021 | Vantage Point Survey | VP1             | 3              | 08:30      | 11:35    | Dry, good visibility, S wind F1          | GW       |                    |
| 02/12/2021 | Vantage Point Survey | VP2             | 3              | 13:45      | 16:35    | Dry, good visibility, S wind F1          | GW       |                    |
| 03/12/2021 | Vantage Point Survey | VP2             | 3              | 08:15      | 11:15    | Dry, good visibility, WSW wind F2        | GW       |                    |
| 03/12/2021 | Vantage Point Survey | VP1             | 3              | 13:40      | 16:40    | Dry, good visibility, SSW wind F1        | GW       |                    |
| 03/01/2022 | Vantage Point Survey | VP2             | 3              | 08:15      | 11:15    | Light rain, good visibility, NNE wind F2 | GW       |                    |
| 03/01/2022 | Vantage Point Survey | VP1             | 3              | 13:30      | 16:30    | Light rain, good visibility, NNE wind F3 | GW       |                    |
| 04/01/2022 | Vantage Point Survey | VP1             | 3              | 08:30      | 11:30    | Dry, good visibility, SSE wind F2        | GW       |                    |
| 04/01/2022 | Vantage Point Survey | VP2             | 3              | 13:45      | 16:45    | Dry, good visibility, SE wind F2         | GW       |                    |
| 21/02/2022 | Vantage Point Survey | VP1             | 3              | 07:30      | 10:30    | Dry, good visibility, SE wind F6         | GW       |                    |
| 21/02/2022 | Vantage Point Survey | VP2             | 3              | 13:00      | 16:00    | Dry, good visibility, SE wind F3         | GW       |                    |
| 22/02/2022 | Vantage Point Survey | VP2             | 3              | 08:00      | 11:00    | Dry, good visibility, NE wind F2         | GW       |                    |
| 22/02/2022 | Vantage Point Survey | VP1             | 3              | 13:45      | 16:45    | Dry, good visibility, NE wind F2         | GW       |                    |
| 07/03/2022 | Vantage Point Survey | VP1             | 3              | 07:30      | 10:30    | Dry, moderate visibility, NW wind F2     | GW       |                    |
| 07/03/2022 | Vantage Point Survey | VP2             | 3              | 13:30      | 16:30    | Dry, good visibility, NW wind F2         | GW       |                    |

| Date       | Survey type          | Survey Location | Duration (hrs) | Start time | End time | Weather                                         | Surveyor | Comments (general)                 |
|------------|----------------------|-----------------|----------------|------------|----------|-------------------------------------------------|----------|------------------------------------|
| 08/03/2022 | Vantage Point Survey | VP2             | 3              | 07:30      | 10:30    | Light rain, good visibility, NW wind F4         | GW       |                                    |
| 08/03/2022 | Vantage Point Survey | VP1             | 3              | 13:30      | 16:30    | Light rain, good visibility, NW wind F2         | GW       |                                    |
| 05/04/2022 | Vantage Point Survey | VP3             | 3              | 15:55      | 18:55    | Dry, good visibility, S wind F5                 | BD       | No obs                             |
| 07/04/2022 | Vantage Point Survey | VP2             | 3              | 09:30      | 12:30    | Dry, good visibility, NW wind F5                | BD       |                                    |
| 07/04/2022 | Vantage Point Survey | VP3             | 3              | 10:30      | 13:30    | Dry, good visibility, NW wind F5                | GW       |                                    |
| 10/04/2022 | Vantage Point Survey | VP1             | 3              | 14:05      | 17:05    | Dry, good visibility, S wind F4                 | BD       |                                    |
| 10/04/2022 | Vantage Point Survey | VP2             | 3              | 17:25      | 20:25    | Dry, good visibility, S wind F3                 | BD       | No obs                             |
| 11/04/2022 | Vantage Point Survey | VP1             | 3              | 08:10      | 11:10    | Heavy rain showers, good visibility, SW wind F3 | BD       | No obs                             |
| 11/04/2022 | Vantage Point Survey | VP3             | 3              | 11:30      | 14:30    | Light showers, good visibility, SE wind F4      | BD       |                                    |
| 12/04/2022 | Vantage Point Survey | VP2             | 3              | 06:45      | 09:45    | Dry, good visibility, S wind F1                 | BD       |                                    |
| 12/04/2022 | Vantage Point Survey | VP1             | 3              | 15:20      | 18:20    | Dry, good visibility, NW wind F1                | BD       |                                    |
| 13/04/2022 | Vantage Point Survey | VP3             | 3              | 09:55      | 12:55    | Dry, good visibility, W wind F1                 | BD       |                                    |
| 12/05/2022 | Vantage Point Survey | VP2             | 3              | 06:30      | 09:30    | Dry, good visibility, NE wind F1                | GW       | No obs                             |
| 19/05/2022 | Vantage Point Survey | VP3             | 3              | 09:30      | 12:30    | Dry, good visibility, SW wind F3                | BD       |                                    |
| 19/05/2022 | Vantage Point Survey | VP1             | 3              | 12:50      | 15:50    | Dry, good visibility, S wind F3                 | BD       |                                    |
| 19/05/2022 | Vantage Point Survey | VP2             | 3              | 16:20      | 19:20    | Dry, good visibility, S wind F2                 | BD       |                                    |
| 21/05/2022 | Vantage Point Survey | VP1             | 3              | 09:40      | 12:40    | Dry, good visibility, S wind F2                 | BD       | Cuckoo & woodpecker heard off-site |
| 21/05/2022 | Vantage Point Survey | VP3             | 3              | 14:30      | 17:30    | Dry, good visibility, S wind F2                 | BD       |                                    |
| 22/05/2022 | Vantage Point Survey | VP2             | 3              | 10:25      | 13:25    | Dry, good visibility, SW wind F2                | BD       |                                    |
| 22/05/2022 | Vantage Point Survey | VP1             | 3              | 13:55      | 16:55    | Dry, good visibility, SW wind F3                | BD       |                                    |
| 24/05/2022 | Vantage Point Survey | VP1             | 3              | 15:30      | 18:30    | Dry, good visibility, SE wind F3                | GW       | No obs                             |
| 31/05/2022 | Vantage Point Survey | VP2             | 3              | 08:55      | 11:55    | Dry, good visibility, NW wind F3                | BD       |                                    |
| 31/05/2022 | Vantage Point Survey | VP3             | 3              | 18:20      | 21:20    | Dry, good visibility, N wind F1                 | BD       |                                    |
| 01/06/2022 | Vantage Point Survey | VP1             | 3              | 05:50      | 08:50    | Dry, good visibility, W wind F2                 | BD       | Cattle Egret seen off site.        |
| 02/06/2022 | Vantage Point Survey | VP3             | 3              | 05:30      | 08:30    | Dry, good visibility, SE wind F1                | BD       |                                    |
| 02/06/2022 | Vantage Point Survey | VP2             | 3              | 08:55      | 11:55    | Dry, good visibility, SE wind F2                | BD       | No obs                             |
| 29/06/2022 | Vantage Point Survey | VP1             | 3              | 17:20      | 20:20    | Dry, good visibility, W wind F1                 | BD       |                                    |
| 30/06/2022 | Vantage Point Survey | VP2             | 3              | 13:20      | 16:20    | Dry, good visibility, W wind F3                 | BD       |                                    |

| Date       | Survey type          | Survey Location | Duration (hrs) | Start time | End time | Weather                                         | Surveyor | Comments (general)                                                                                                                                                                                     |
|------------|----------------------|-----------------|----------------|------------|----------|-------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 30/06/2022 | Vantage Point Survey | VP3             | 3              | 17:15      | 20:15    | Dry, good visibility, SW wind F1                | BD       | No obs                                                                                                                                                                                                 |
| 02/07/2022 | Vantage Point Survey | VP3             | 3              | 13:30      | 16:30    | Dry, good visibility, S wind F2                 | BD       |                                                                                                                                                                                                        |
| 02/07/2022 | Vantage Point Survey | VP2             | 3              | 16:55      | 19:55    | Dry, good visibility, S wind F2                 | BD       |                                                                                                                                                                                                        |
| 03/07/2022 | Vantage Point Survey | VP2             | 3              | 11:25      | 14:25    | Dry, good visibility, W wind F2                 | BD       | No obs                                                                                                                                                                                                 |
| 03/07/2022 | Vantage Point Survey | VP1             | 3              | 15:00      | 18:00    | Dry, good visibility, W wind F2                 | BD       |                                                                                                                                                                                                        |
| 05/07/2022 | Vantage Point Survey | VP3             | 3              | 07:15      | 10:15    | Dry, good visibility, W wind F2                 | BD       | No obs                                                                                                                                                                                                 |
| 05/07/2022 | Vantage Point Survey | VP1             | 3              | 10:45      | 13:45    | Dry, good visibility, W wind F2                 | BD       | No obs                                                                                                                                                                                                 |
| 09/08/2022 | Vantage Point Survey | VP3             | 3              | 18:00      | 21:00    | Dry, good visibility, W wind F1                 | BD       | No obs                                                                                                                                                                                                 |
| 10/08/2022 | Vantage Point Survey | VP2             | 3              | 09:55      | 12:55    | Dry, good visibility, SW wind F1                | BD       |                                                                                                                                                                                                        |
| 10/08/2022 | Vantage Point Survey | VP1             | 3              | 13:20      | 16:20    | Dry, good visibility, SW wind F1                | BD       |                                                                                                                                                                                                        |
| 24/10/2022 | Vantage Point Survey | VP1             | 3              | 16:10      | 19:10    | Dry, Good visibility, SW wind F2                | MD       |                                                                                                                                                                                                        |
| 25/10/2022 | Vantage Point Survey | VP1             | 3              | 07:20      | 10:20    | Dry, Good visibility, SE wind F3                | MD       |                                                                                                                                                                                                        |
| 25/10/2022 | Vantage Point Survey | VP1             | 6              | 10:50      | 17:20    | Drizzle, good visibility, SE wind F4            | MD       | Large flock of Golden Plover (ca 8k birds) circling to the east of study area (11:30 to 16:40) at approx. height between 150 and 300m. Number of birds dropping periodically due to presumed foraging. |
| 26/10/2022 | Vantage Point Survey | VP3             | 6              | 09:00      | 15:30    | Light showers, good visibility, SSW wind F5     | MD       |                                                                                                                                                                                                        |
| 26/10/2022 | Vantage Point Survey | VP3             | 3              | 16:00      | 19:00    | Drizzle, good visibility, SW wind F4            | MD       |                                                                                                                                                                                                        |
| 27/10/2022 | Vantage Point Survey | VP3             | 3              | 07:20      | 10:20    | Light showers, moderate visibility, SSE wind F3 | MD       | Visibility declined as mist moved in.                                                                                                                                                                  |
| 27/10/2022 | Vantage Point Survey | VP2             | 6              | 10:50      | 17:20    | Light showers, good visibility, SE wind F3      | MD       |                                                                                                                                                                                                        |
| 10/11/2022 | Vantage Point Survey | VP3             | 6              | 07:55      | 14:25    | Drizzle, good visibility, SW wind F5            | MD       |                                                                                                                                                                                                        |
| 10/11/2022 | Vantage Point Survey | VP1             | 3              | 14:40      | 17:40    | Drizzle, moderate visibility, SW wind F6        | MD       | No obs                                                                                                                                                                                                 |
| 11/11/2022 | Vantage Point Survey | VP2             | 6              | 08:00      | 14:30    | Drizzle, good visibility, SSW wind F6           | MD       |                                                                                                                                                                                                        |
| 11/11/2022 | Vantage Point Survey | VP2             | 3              | 14:40      | 17:40    | Drizzle, good visibility, SW wind F3            | MD       |                                                                                                                                                                                                        |

| Date       | Survey type          | Survey Location | Duration (hrs) | Start time | End time | Weather                                        | Surveyor | Comments (general) |
|------------|----------------------|-----------------|----------------|------------|----------|------------------------------------------------|----------|--------------------|
| 12/11/2022 | Vantage Point Survey | VP2             | 3              | 06:50      | 09:50    | Drizzle, moderate visibility, SE wind F3       | MD       | No obs             |
| 12/11/2022 | Vantage Point Survey | VP1             | 6              | 10:20      | 16:50    | Drizzle, good visibility, SE wind F3           | MD       |                    |
| 13/11/2022 | Vantage Point Survey | VP1             | 3              | 06:50      | 09:50    | Drizzle, good visibility, SE wind F2           | MD       |                    |
| 04/12/2022 | Vantage Point Survey | VP3             | 6              | 09:00      | 15:30    | Light showers, good visibility, NE wind F2     | MD       |                    |
| 05/12/2022 | Vantage Point Survey | VP1             | 6              | 10:00      | 16:40    | Light showers, good visibility, NE wind F3     | MD       |                    |
| 06/12/2022 | Vantage Point Survey | VP2             | 6              | 09:10      | 15:40    | Dry, good visibility, NE wind F2               | MD       |                    |
| 09/01/2023 | Vantage Point Survey | VP3             | 6              | 09:10      | 15:40    | Light showers, good visibility, W wind F5      | MD       | No obs             |
| 10/01/2023 | Vantage Point Survey | VP2             | 6              | 09:00      | 15:30    | Dry, good visibility, W wind F3                | MD       |                    |
| 11/01/2023 | Vantage Point Survey | VP1             | 6              | 08:50      | 15:20    | Light showers, moderate visibility, SW wind F5 | MD       |                    |
| 03/02/2023 | Vantage Point Survey | VP1             | 6              | 08:45      | 15:15    | Dry, good visibility, SW wind F2               | MD       |                    |
| 04/02/2023 | Vantage Point Survey | VP3             | 6              | 09:10      | 15:40    | Light showers, moderate visibility, SW wind F3 | MD       | No obs             |
| 07/02/2023 | Vantage Point Survey | VP2             | 6              | 11:00      | 17:30    | Dry, good visibility, SW wind F2               | MD       |                    |
| 02/03/2023 | Vantage Point Survey | VP1             | 3              | 16:00      | 19:00    | Dry, Good visibility, W wind F2                | MD       |                    |
| 03/03/2023 | Vantage Point Survey | VP1             | 3              | 06:20      | 09:20    | Dry, Good visibility, WNW wind F2              | MD       |                    |
| 03/03/2023 | Vantage Point Survey | VP3             | 6              | 10:00      | 16:30    | Dry, good visibility, W wind F2                | MD       | No obs             |
| 10/03/2023 | Vantage Point Survey | VP2             | 3              | 06:20      | 09:20    | Dry, Good visibility, WSW wind F2              | MD       | No obs             |
| 10/03/2023 | Vantage Point Survey | VP1             | 6              | 09:55      | 16:25    | Drizzle, good visibility, WSW wind F2          | MD       |                    |
| 12/03/2023 | Vantage Point Survey | VP2             | 6              | 08:50      | 15:20    | Drizzle, good visibility, SSW wind F2          | MD       |                    |
| 12/03/2023 | Vantage Point Survey | VP2             | 3              | 16:10      | 19:10    | Drizzle, good visibility, SSW wind F2          | MD       | No obs             |
| 22/05/2023 | Vantage Point Survey | VP1             | 6              | 09:40      | 16:10    | Dry, good visibility, WNW wind F2              | MD       |                    |
| 24/05/2023 | Vantage Point Survey | VP2             | 6              | 11:20      | 17:50    | Dry, good visibility, WNW wind F3              | MD       |                    |



| Date       | Survey type          | Survey Location | Duration (hrs) | Start time | End time | Weather                                       | Surveyor | Comments (general) |
|------------|----------------------|-----------------|----------------|------------|----------|-----------------------------------------------|----------|--------------------|
| 25/05/2023 | Vantage Point Survey | VP3             | 6              | 08:10      | 14:40    | Dry, good visibility, NNW wind F3             | MD       |                    |
| 01/06/2023 | Vantage Point Survey | VP1             | 6              | 09:00      | 15:30    | Dry, good visibility, ESE wind F2             | MD       | No obs             |
| 02/06/2023 | Vantage Point Survey | VP2             | 6              | 08:50      | 15:20    | Dry, good visibility, SE wind F3              | MD       |                    |
| 21/06/2023 | Vantage Point Survey | VP3             | 6              | 05:00      | 11:30    | Dry, good visibility, SW wind F2              | MD       |                    |
| 01/07/2023 | Vantage Point Survey | VP3             | 6              | 10:00      | 16:30    | Heavy showers, good visibility, WNW wind F2   | MD       | No obs             |
| 04/07/2023 | Vantage Point Survey | VP2             | 6              | 08:30      | 15:00    | Light showers, good visibility, WSW wind F3   | MD       |                    |
| 06/07/2023 | Vantage Point Survey | VP1             | 6              | 10:10      | 16:40    | Light showers, good visibility, S wind F3     | MD       |                    |
| 08/07/2023 | Vantage Point Survey | VP2             | 6              | 14:40      | 21:10    | Dry, good visibility, SSE wind F3             | MD       |                    |
| 09/07/2023 | Vantage Point Survey | VP1             | 6              | 09:50      | 16:20    | Heavy showers, good visibility, SSE wind F3   | MD       |                    |
| 10/07/2023 | Vantage Point Survey | VP3             | 6              | 06:30      | 13:00    | Light showers, good visibility, SSE wind F2   | MD       | No obs             |
| 06/08/2023 | Vantage Point Survey | VP1             | 6              | 11:20      | 17:50    | Drizzle, good visibility, WNW wind F3         | MD       | No obs             |
| 07/08/2023 | Vantage Point Survey | VP2             | 6              | 06:50      | 13:20    | Dry, good visibility, SW wind F2              | MD       |                    |
| 08/08/2023 | Vantage Point Survey | VP3             | 6              | 07:00      | 13:30    | Light showers, good visibility, NNE wind F3   | MD       |                    |
| 12/09/2023 | Vantage Point Survey | VP2             | 6              | 09:40      | 16:10    | Dry, good visibility, N wind F3               | MD       |                    |
| 12/09/2023 | Vantage Point Survey | VP2             | 3              | 17:45      | 20:45    | Dry, Good visibility, NNE wind F2             | MD       | dusk               |
| 13/09/2023 | Vantage Point Survey | VP3             | 3              | 06:20      | 09:20    | Dry, Good visibility, SSW wind F1             | MD       | No obs (dawn)      |
| 13/09/2023 | Vantage Point Survey | VP1             | 6              | 10:00      | 16:30    | Light showers, moderate visibility, S wind F3 | MD       |                    |
| 14/09/2023 | Vantage Point Survey | VP3             | 6              | 08:10      | 14:40    | Dry, moderate visibility, SW wind F2          | MD       | No obs             |
| 14/09/2023 | Vantage Point Survey | VP3             | 3              | 17:40      | 20:40    | Dry, Good visibility, SW wind F2              | MD       | dusk               |
| 15/09/2023 | Vantage Point Survey | VP2             | 3              | 06:20      | 09:20    | Light showers, NW wind F3                     | MD       | No obs (dawn)      |

Table 2: Details of Winter Walkover Surveys undertaken at Derrynadarragh Wind Farm October 2021 to September 2023.

| Date       | Survey type     | Survey Location     | Duration (hrs) | Start time | End time | Weather                                  | Surveyor | Comments (general)   |
|------------|-----------------|---------------------|----------------|------------|----------|------------------------------------------|----------|----------------------|
| 11/10/2021 | Winter Walkover | Walkover transect 1 | 2              | 15:00      | 17:00    | Dry, moderate visibility, calm           | GW       |                      |
| 12/10/2021 | Winter Walkover | Walkover transect 1 | 2              | 16:00      | 18:00    | Dry, good visibility, calm               | GW       |                      |
| 08/11/2021 | Winter Walkover | Walkover transect 1 | 2              | 11:00      | 13:00    | Dry, good visibility, S wind F1          | GW       |                      |
| 09/11/2021 | Winter Walkover | Walkover transect 1 | 2              | 10:30      | 12:30    | Dry, good visibility, WSW wind F1        | GW       |                      |
| 02/12/2021 | Winter Walkover | Walkover transect 1 | 2              | 11:35      | 13:35    | Dry, good visibility, S wind F2          | GW       |                      |
| 03/12/2021 | Winter Walkover | Walkover transect 1 | 2              | 11:30      | 13:30    | Light rain, good visibility, WSW wind F2 | GW       |                      |
| 03/01/2022 | Winter Walkover | Walkover transect 1 | 2              | 11:25      | 13:25    | Dry, good visibility, NNE wind F2        | GW       |                      |
| 04/01/2022 | Winter Walkover | Walkover transect 1 | 2              | 11:35      | 13:35    | Dry, good visibility, SE wind F1         | GW       |                      |
| 21/02/2022 | Winter Walkover | Walkover transect 1 | 2              | 10:45      | 12:45    | Dry, good visibility, SE wind F5         | GW       | Site flooded, no obs |
| 22/02/2022 | Winter Walkover | Walkover transect 1 | 2              | 11:30      | 13:30    | Dry, good visibility, E wind F1          | GW       | Site flooded, no obs |
| 07/03/2022 | Winter Walkover | Walkover transect 1 | 2              | 11:00      | 11:30    | Dry, good visibility, NW wind F2         | GW       |                      |
| 08/03/2022 | Winter Walkover | Walkover transect 1 | 2              | 10:45      | 12:45    | Dry, good visibility, NW wind F5         | GW       |                      |
| 31/10/2022 | Winter Walkover | Walkover transect 2 | 6              | 09:15      | 15:05    | Light showers, SW wind F3                | MD       |                      |
| 13/11/2022 | Winter Walkover | Walkover transect 2 | 6.2            | 10:00      | 16:20    | Drizzle, good visibility, SE wind F3     | MD       |                      |
| 07/12/2022 | Winter Walkover | Walkover transect 2 | 6.0            | 08:40      | 14:40    | Dry, Good visibility, NW wind F2         | MD       |                      |
| 12/01/2023 | Winter Walkover | Walkover transect 2 | 6.0            | 09:30      | 15:30    | Drizzle, good visibility, SW wind F2     | MD       |                      |
| 02/02/2023 | Winter Walkover | Walkover transect 2 | 6.0            | 09:00      | 15:00    | Dry, Good visibility, WSW wind F3        | MD       |                      |
| 02/03/2023 | Winter Walkover | Walkover transect 2 | 5.75           | 09:15      | 15:00    | Drizzle, good visibility, WNW wind F2    | MD       |                      |

Table 3: Details of Breeding Walkover Surveys undertaken at Derrynadarragh Wind Farm October 2021 to September 2023.

| Date       | Survey type       | Survey Location     | Duration (hrs) | Start time | End time | Weather                                 | Surveyor | Comments (general) |
|------------|-------------------|---------------------|----------------|------------|----------|-----------------------------------------|----------|--------------------|
| 07/04/2022 | Breeding Walkover | Walkover transect 1 | 3              | 14:00      | 17:00    | Dry, good visibility, SE wind F4        | GW       |                    |
| 08/04/2022 | Breeding Walkover | Walkover transect 1 | 3              | 10:30      | 13:30    | Dry, good visibility, NE wind F1        | GW       |                    |
| 21/04/2022 | Breeding Walkover | Walkover transect 1 | 3              | 07:30      | 10:30    | Dry, good visibility, NW wind F1        | GW       |                    |
| 21/04/2022 | Breeding Walkover | Walkover transect 1 | 3              | 11:00      | 14:00    | Dry, good visibility, NW wind F1        | GW       |                    |
| 12/05/2022 | Breeding Walkover | Walkover transect 1 | 3              | 09:30      | 12:30    | Dry, good visibility, NE wind F3        | GW       |                    |
| 13/05/2022 | Breeding Walkover | Walkover transect 1 | 3              | 11:00      | 14:00    | Dry, good visibility, NE wind F4        | GW       |                    |
| 23/05/2022 | Breeding Walkover | Walkover transect 1 | 3              | 13:30      | 16:30    | Light rain, good visibility, SE wind F3 | GW       |                    |
| 24/05/2022 | Breeding Walkover | Walkover transect 1 | 3              | 10:00      | 13:00    | Dry, good visibility, SE wind F3        | GW       |                    |
| 09/06/2022 | Breeding Walkover | Walkover transect 1 | 3              | 14:30      | 17:30    | Dry, good visibility, NE wind F3        | GW       |                    |
| 09/06/2022 | Breeding Walkover | Walkover transect 1 | 3              | 19:30      | 22:30    | Dry, good visibility, NE wind F3        | GW       |                    |
| 10/06/2022 | Breeding Walkover | Walkover transect 1 | 3              | 04:30      | 07:30    | Dry, good visibility, NE wind F3        | GW       |                    |
| 10/06/2022 | Breeding Walkover | Walkover transect 1 | 3              | 10:00      | 13:00    | Dry, good visibility, NE wind F3        | GW       |                    |
| 27/05/2023 | Breeding Walkover | Walkover transect 2 | 5.4            | 08:00      | 13:40    | Dry, Good visibility, SE wind F2        | MD       |                    |
| 03/06/2023 | Breeding Walkover | Walkover transect 2 | 5.4            | 08:00      | 13:40    | Dry, Good visibility, SW wind F3        | MD       |                    |
| 10/07/2023 | Breeding Walkover | Walkover transect 2 | 5.2            | 13:30      | 19:10    | Drizzle, good visibility, SE wind F3    | MD       |                    |
| 05/08/2023 | Breeding Walkover | Walkover transect 2 | 0.2            | 09:30      | 13:50    | Dry, Good visibility, NNW wind F2       | MD       |                    |
| 15/09/2023 | Breeding Walkover | Walkover transect 2 | 5.4            | 10:00      | 15:40    | Drizzle, good visibility, NW wind F3    | MD       |                    |

Table 4: Details of Breeding Raptor Surveys undertaken at Derrynadarragh Wind Farm (and surrounding area + 2.5km) during breeding season 2023.

| Date       | Survey type     | Survey Location | Duration (hrs) | Start time | End time | Weather                            | Surveyor | Comments (general) |
|------------|-----------------|-----------------|----------------|------------|----------|------------------------------------|----------|--------------------|
| 22/05/2023 | Breeding Raptor | BR VP 1         | 3              | 06:00      | 09:00    | Dry, Good visibility, NW wind F1   | MD       | No obs             |
| 24/05/2023 | Breeding Raptor | BR VP 2         | 3              | 07:50      | 10:50    | Dry, Good visibility, WNW wind F1  | MD       | No obs             |
| 01/06/2023 | Breeding Raptor | BR VP 3         | 3              | 05:30      | 08:30    | Dry, Good visibility, SE wind F1   | MD       |                    |
| 02/06/2023 | Breeding Raptor | BR VP 4         | 3              | 16:00      | 19:00    | Dry, Good visibility, SE wind F3   | MD       | No obs             |
| 06/07/2023 | Breeding Raptor | BR VP 3         | 3              | 06:30      | 09:30    | Light showers, S wind F2           | MD       |                    |
| 09/07/2023 | Breeding Raptor | BR VP 5         | 3              | 06:20      | 09:20    | Heavy showers, moderate visibility | MD       | No obs             |

Table 5: Details of breeding wader (curlew) surveys (and surrounding area within 2km) during breeding season 2022 and 2025.

| Date       | Survey type                      | Survey Location | Duration (hrs) | Start time | End time | Weather                                        | Surveyor | Comments (general) |
|------------|----------------------------------|-----------------|----------------|------------|----------|------------------------------------------------|----------|--------------------|
| 13/04/2022 | Breeding Wader Survey (VP)       | BW VP1          | 3              | 06:45      | 09:45    | Dry, good visibility, 0 wind F0                | BD       |                    |
| 21/05/2022 | Breeding Wader Survey (VP)       | BW VP1          | 3              | 06:10      | 09:10    | Dry, good visibility, SE wind F2               | BD       |                    |
| 31/05/2022 | Breeding Wader Survey (VP)       | BW VP1          | 2              | 12:30      | 14:30    | Dry, good visibility, W wind F4                | BD       |                    |
| 01/06/2022 | Breeding Wader Survey (VP)       | BW VP1          | 3              | 09:35      | 12:35    | Dry, good visibility, W wind F1                | BD       | No obs             |
| 20/04/2025 | Breeding Wader Survey (walkover) | BW T1           | 3              | 14:15      | 17:15    | Dry, Good visibility, ESE wind F3              | MD       |                    |
| 27/05/2025 | Breeding Wader Survey (walkover) | BW T1           | 3              | 07:00      | 10:00    | Light showers, moderate visibility, WS wind F1 | MD       | No obs             |
| 17/06/2025 | Breeding Wader Survey (walkover) | BW T1           | 3              | 07:10      | 10:00    | Dry, Good visibility, SW wind F3               | MD       | No obs             |

Table 6: Details of breeding woodcock survey undertaken during breeding season 2025.

| Date       | Survey type              | Survey Location  | Duration (hrs) | Start time | End time | Weather                                        | Surveyor | Comments (general) |
|------------|--------------------------|------------------|----------------|------------|----------|------------------------------------------------|----------|--------------------|
| 23/06/2025 | Breeding Woodcock Survey | Woodcock habitat | 3.0            | 21:00      | 00:00    | Drizzle, limited visibility (dusk), SW wind F3 | MD       | dusk / nocturnal   |

## APPENDIX 10.3

### Summary Data



## Appendix 10-3

## Ornithology summary data at Derrynadarragh Wind Farm to inform Environmental Impact Assessment

Table 1: Number of observations and flight duration per species per month from VP Surveys undertaken at Derrynadarragh Wind Farm October 2021 to September 2023.

| Species       | Year | Parameter             | Jan | Feb | Mar | Apr | May  | Jun  | Jul  | Aug  | Sept | Oct  | Nov | Dec |
|---------------|------|-----------------------|-----|-----|-----|-----|------|------|------|------|------|------|-----|-----|
| Buzzard       | 2021 | Observations          |     |     |     |     |      |      |      |      |      | 8    | 6   | 6   |
|               |      | Flight duration (sec) |     |     |     |     |      |      |      |      |      | 292  | 150 | 287 |
|               | 2022 | Observations          | 11  | 10  | 9   | 7   | 10   | 4    | 3    | 4    |      | 5    | 6   | 3   |
|               |      | Flight duration (sec) | 690 | 436 | 579 | 479 | 4995 | 1098 | 89   | 3330 |      | 324  | 276 | 150 |
|               | 2023 | Observations          |     | 4   | 3   |     | 8    | 8    | 11   | 3    | 10   |      |     |     |
|               |      | Flight duration (sec) |     | 172 | 284 |     | 958  | 469  | 1598 | 281  | 1227 |      |     |     |
| Curlew        | 2021 | Observations          |     |     |     |     |      |      |      |      |      |      |     |     |
|               |      | Flight duration (sec) |     |     |     |     |      |      |      |      |      |      |     |     |
|               | 2022 | Observations          |     |     |     | 1   | 1    |      |      |      |      |      |     |     |
|               |      | Flight duration (sec) |     |     |     | 525 | 18   |      |      |      |      |      |     |     |
|               | 2023 | Observations          |     |     |     |     |      |      |      |      |      |      |     |     |
|               |      | Flight duration (sec) |     |     |     |     |      |      |      |      |      |      |     |     |
| Golden Plover | 2021 | Observations          |     |     |     |     |      |      |      |      |      |      | 1   |     |
|               |      | Flight duration (sec) |     |     |     |     |      |      |      |      |      |      | 87  |     |
|               | 2022 | Observations          |     | 5   | 4   | 9   |      |      |      |      |      | 12   | 2   | 1   |
|               |      | Flight duration (sec) |     | 121 | 121 | 67  |      |      |      |      |      | 6915 | 125 | 50  |
|               | 2023 | Observations          |     |     | 3   |     |      |      |      |      |      |      |     |     |
|               |      | Flight duration (sec) |     |     | 205 |     |      |      |      |      |      |      |     |     |
| Hen Harrier   | 2021 | Observations          |     |     |     |     |      |      |      |      |      |      | 1   |     |
|               |      | Flight duration (sec) |     |     |     |     |      |      |      |      |      |      | 87  |     |
|               | 2022 | Observations          |     |     |     |     |      | 1    | 1    |      |      |      |     |     |
|               |      | Flight duration (sec) |     |     |     |     |      | 15   | 5    |      |      |      |     |     |
|               | 2023 | Observations          |     | 2   |     |     |      |      |      |      |      |      |     |     |
|               |      | Flight duration (sec) |     | 60  |     |     |      |      |      |      |      |      |     |     |
| Kestrel       | 2021 | Observations          |     |     |     |     |      |      |      |      |      | 3    | 2   | 4   |
|               |      | Flight duration (sec) |     |     |     |     |      |      |      |      |      | 196  | 86  | 333 |
|               | 2022 | Observations          | 3   | 2   | 2   |     | 1    |      |      |      |      | 1    | 4   | 2   |
|               |      | Flight duration (sec) | 211 | 231 | 233 |     | 33   |      |      |      |      | 75   | 483 | 550 |
|               | 2023 | Observations          | 2   |     | 3   |     |      | 1    | 3    | 2    |      |      |     |     |

[illegible]



[illegible]

Table 2: Summary data from winter walkover surveys undertaken at Derrynadarragh Wind Farm October 2021 to September 2023.

| Species       | Year       | Parameter    | Oct  | Nov | Dec | Jan | Feb | Mar |
|---------------|------------|--------------|------|-----|-----|-----|-----|-----|
| Buzzard       | 2021-2022  | Observations | 2    |     |     |     |     |     |
|               | 2021-2022  | Number       | 2    |     |     |     |     |     |
|               | 2022- 2023 | Observations | 3    |     |     | 1   | 1   | 2   |
|               | 2022- 2023 | Number       | 3    |     |     | 1   | 1   | 2   |
| Golden Plover | 2021-2022  | Observations |      |     |     |     |     |     |
|               | 2021-2022  | Number       |      |     |     |     |     |     |
|               | 2022- 2023 | Observations | 2    |     | 1   |     | 1   |     |
|               | 2022- 2023 | Number       | 1700 |     | 18  |     | 30  |     |
| Grey Heron    | 2021-2022  | Observations |      |     |     |     |     |     |
|               | 2021-2022  | Number       |      |     |     |     |     |     |
|               | 2022- 2023 | Observations |      |     |     |     | 1   | 1   |
|               | 2022- 2023 | Number       |      |     |     |     | 1   | 1   |
| Grey Wagtail  | 2021-2022  | Observations |      |     |     |     |     |     |
|               | 2021-2022  | Number       |      |     |     |     |     |     |
|               | 2022- 2023 | Observations |      | 2   |     |     |     |     |
|               | 2022- 2023 | Number       |      | 2   |     |     |     |     |
| Kestrel       | 2021-2022  | Observations | 1    |     | 1   |     |     | 1   |
|               | 2021-2022  | Number       | 1    |     | 1   |     |     | 1   |
|               | 2022- 2023 | Observations | 1    | 1   | 1   |     |     | 1   |
|               | 2022- 2023 | Number       | 1    | 1   | 1   |     |     | 1   |
| Kingfisher    | 2021-2022  | Observations |      |     | 1   |     |     |     |
|               | 2021-2022  | Number       |      |     | 1   |     |     |     |
|               | 2022- 2023 | Observations |      |     |     |     |     |     |
|               | 2022- 2023 | Number       |      |     |     |     |     |     |
| Linnet        | 2021-2022  | Observations | 1    |     | 1   |     |     |     |
|               | 2021-2022  | Number       | 18   |     | 12  |     |     |     |
|               | 2022- 2023 | Observations |      |     |     |     |     |     |
|               | 2022- 2023 | Number       |      |     |     |     |     |     |
| Mallard       | 2021-2022  | Observations |      |     |     |     |     |     |
|               | 2021-2022  | Number       |      |     |     |     |     |     |
|               | 2022- 2023 | Observations | 1    |     | 1   |     |     | 2   |
|               | 2022- 2023 | Number       | 3    |     | 2   |     |     | 5   |

| Species      | Year       | Parameter    | Oct | Nov | Dec | Jan | Feb | Mar |
|--------------|------------|--------------|-----|-----|-----|-----|-----|-----|
| Meadow Pipit | 2021-2022  | Observations | 2   | 1   | 1   |     |     | 1   |
|              | 2021-2022  | Number       | 23  | 15  | 17  |     |     | 1   |
|              | 2022- 2023 | Observations | 6   | 5   | 3   | 1   | 3   | 8   |
|              | 2022- 2023 | Number       | 30  | 17  | 11  | 4   | 8   | 26  |
| Redwing      | 2021-2022  | Observations |     |     |     |     |     |     |
|              | 2021-2022  | Number       |     |     |     |     |     |     |
|              | 2022- 2023 | Observations | 5   | 5   | 7   | 6   | 6   | 4   |
|              | 2022- 2023 | Number       | 44  | 40  | 35  | 37  | 63  | 29  |
| Skylark      | 2021-2022  | Observations | 1   |     |     |     |     |     |
|              | 2021-2022  | Number       | 1   |     |     |     |     |     |
|              | 2022- 2023 | Observations |     |     |     |     |     |     |
|              | 2022- 2023 | Number       |     |     |     |     |     |     |
| Snipe        | 2021-2022  | Observations | 1   | 1   |     | 1   |     |     |
|              | 2021-2022  | Number       | 2   | 1   |     | 1   |     |     |
|              | 2022- 2023 | Observations | 2   |     | 3   | 3   | 1   | 2   |
|              | 2022- 2023 | Number       | 6   |     | 6   | 5   | 3   | 3   |
| Sparrowhawk  | 2021-2022  | Observations |     |     |     |     |     | 1   |
|              | 2021-2022  | Number       |     |     |     |     |     | 1   |
|              | 2022- 2023 | Observations | 1   | 2   | 1   |     | 1   |     |
|              | 2022- 2023 | Number       | 1   | 2   | 1   |     | 1   |     |
| Woodcock     | 2021-2022  | Observations | 1   |     |     |     |     |     |
|              | 2021-2022  | Number       | 1   |     |     |     |     |     |
|              | 2022- 2023 | Observations |     |     |     |     |     |     |
|              | 2022- 2023 | Number       |     |     |     |     |     |     |
| Yellowhammer | 2021-2022  | Observations | 1   | 1   | 1   | 2   |     | 1   |
|              | 2021-2022  | Number       | 9   | 5   | 2   | 2   |     | 1   |
|              | 2022- 2023 | Observations |     |     | 1   | 2   | 2   | 1   |
|              | 2022- 2023 | Number       |     |     | 1   | 5   | 4   | 3   |

Table 3: Summary data from breeding walkover surveys undertaken at Derrynadarragh Wind Farm October 2021 to September 2023.

| Species       | Year | Parameter    | Apr | May | Jun | Jul | Aug | Sept |
|---------------|------|--------------|-----|-----|-----|-----|-----|------|
| Buzzard       | 2022 | Observations |     |     |     |     |     |      |
|               | 2022 | Number       |     |     |     |     |     |      |
|               | 2023 | Observations |     | 3   | 2   | 2   | 1   | 1    |
|               | 2023 | Number       |     | 5   | 2   | 2   | 1   | 1    |
| Curlew        | 2022 | Observations |     |     |     |     |     |      |
|               | 2022 | Number       |     |     |     |     |     |      |
|               | 2023 | Observations |     |     | 1   |     |     |      |
|               | 2023 | Number       |     |     | 2   |     |     |      |
| Golden Plover | 2022 | Observations |     |     |     |     |     | 1    |
|               | 2022 | Number       |     |     |     |     |     | 8    |
|               | 2023 | Observations |     |     |     |     |     |      |
|               | 2023 | Number       |     |     |     |     |     |      |
| Grey Heron    | 2022 | Observations |     |     |     |     |     |      |
|               | 2022 | Number       |     |     |     |     |     |      |
|               | 2023 | Observations |     | 1   |     |     | 1   |      |
|               | 2023 | Number       |     | 1   |     |     | 1   |      |
| Grey Wagtail  | 2022 | Observations | 1   |     |     |     |     |      |
|               | 2022 | Number       | 1   |     |     |     |     |      |
|               | 2023 | Observations |     |     |     |     |     |      |
|               | 2023 | Number       |     |     |     |     |     |      |
| Kestrel       | 2022 | Observations | 2   | 2   |     |     |     |      |
|               | 2022 | Number       | 2   | 2   |     |     |     |      |
|               | 2023 | Observations |     | 1   |     |     |     |      |
|               | 2023 | Number       |     | 1   |     |     |     |      |
| Lapwing       | 2022 | Observations |     |     |     |     |     |      |
|               | 2022 | Number       |     |     |     |     |     |      |
|               | 2023 | Observations |     | 1   |     |     |     |      |
|               | 2023 | Number       |     | 2   |     |     |     |      |
| Mallard       | 2022 | Observations |     |     |     |     |     |      |
|               | 2022 | Number       |     |     |     |     |     |      |
|               | 2023 | Observations |     | 3   | 2   | 1   |     | 2    |
|               | 2023 | Number       |     | 5   | 7   | 3   |     | 4    |

| Species      | Year | Parameter    | Apr | May | Jun | Jul | Aug | Sept |
|--------------|------|--------------|-----|-----|-----|-----|-----|------|
| Meadow Pipit | 2022 | Observations | 3   | 4   | 3   |     |     |      |
|              | 2022 | Number       | 13  | 30  | 14  |     |     |      |
|              | 2023 | Observations |     | 8   | 6   | 6   | 5   | 7    |
|              | 2023 | Number       |     | 28  | 19  | 28  | 33  | 26   |
| Snipe        | 2022 | Observations |     |     |     |     |     |      |
|              | 2022 | Number       |     |     |     |     |     |      |
|              | 2023 | Observations |     |     |     |     |     | 3    |
|              | 2023 | Number       |     |     |     |     |     | 3    |
| Sparrowhawk  | 2022 | Observations |     |     |     |     |     |      |
|              | 2022 | Number       |     |     |     |     |     |      |
|              | 2023 | Observations |     |     |     |     |     | 1    |
|              | 2023 | Number       |     |     |     |     |     | 1    |
| Swift        | 2022 | Observations |     | 1   |     |     |     |      |
|              | 2022 | Number       |     | 1   |     |     |     |      |
|              | 2023 | Observations |     | 2   | 2   | 2   | 1   |      |
|              | 2023 | Number       |     | 4   | 7   | 5   | 2   |      |
| Yellowhammer | 2022 | Observations | 5   | 4   | 4   |     |     |      |
|              | 2022 | Number       | 9   | 22  | 16  |     |     |      |
|              | 2023 | Observations |     | 7   | 7   | 4   | 3   | 5    |
|              | 2023 | Number       |     | 11  | 15  | 8   | 4   | 6    |

Table 4: Summary data from Breeding Raptor Surveys undertaken at Derrynadarragh Wind Farm (and surrounding area + 2.5km) during breeding season 2023.

| Species     | Year | Parameter    | May | Jun | Jul |
|-------------|------|--------------|-----|-----|-----|
| Buzzard     | 2023 | Observations | 0   | 1   | 0   |
|             | 2023 | Number       | 0   | 1   | 0   |
| Kestrel     | 2023 | Observations | 0   | 1   | 0   |
|             | 2023 | Number       | 0   | 1   | 0   |
| Sparrowhawk | 2023 | Observations | 0   | 0   | 1   |
|             | 2023 | Number       | 0   | 0   | 1   |

| Date       | VP No | Observation No | GIS ID | Species     | BTO code | Number | Time  | Activity      | Comments                                                                                 |
|------------|-------|----------------|--------|-------------|----------|--------|-------|---------------|------------------------------------------------------------------------------------------|
| 01/06/2023 | 3     | 1              | 48     | Buzzard     | BZ       | 1      | 08:18 | Travelling    | Adult female BZ flying SE at approx 60 metres. Lost behind forestry                      |
| 01/06/2023 | 3     | 2              | 49     | Kestrel     | K        | 1      | 07:52 | Hunting       | Adult male K hunting. Made one unsuccessful kill attempt.                                |
| 01/06/2023 | 3     | 3              | 50     | Buzzard     | BZ       | 1      | 08:15 | Soaring       | BZ rising on thermal to over 150 metres . Drifted South.                                 |
| 06/07/2023 | 3     | 1              | 51     | Sparrowhawk | SH       | 1      | 07:16 | Carrying prey | Adult male SH carrying passerine prey into forestry. Nest with chick likely in forestry. |

Table 5: Summary data from breeding wader (Curlew) surveys (and surrounding area within 2km) during breeding season 2022 and 2025.

| Species | Year | Parameter    | Apr | May | Jun |
|---------|------|--------------|-----|-----|-----|
| Curlew  | 2022 | Observations | 0   | 2   | 0   |
|         | 2022 | Number       | 0   | 4   | 0   |
| Curlew  | 2025 | Observations | 2   | 0   | 0   |
|         | 2025 | Number       | 2   | 0   | 0   |

Table 6: Summary data from breeding woodcock survey undertaken during breeding season 2025.

| Species  | Year | Parameter    | Jun |
|----------|------|--------------|-----|
| Woodcock | 2025 | Observations | 7   |
|          | 2025 | Number       | 9   |

## APPENDIX 10.4.i

### VP Data and Maps





## Appendix 4a

### Vantage Point Survey Data and Maps

| Date       | VP No | Map label | Species | Number | Time  | Flight Duration | Band 1 (0-25m) | Total flight time Band 1 | Band 2 (25-180m) | Total flight time Band 2 | Band 3 (>180m) | Total flight time Band 3 | Total Flight Time | Proportion of flightline in viewshed | Time flight / In viewshed | Activity | Comments |
|------------|-------|-----------|---------|--------|-------|-----------------|----------------|--------------------------|------------------|--------------------------|----------------|--------------------------|-------------------|--------------------------------------|---------------------------|----------|----------|
| 11/10/2021 | 2     | 1         | Buzzard | 1      | 10:35 | 42              |                | 0                        | 42               | 42                       |                | 0                        | 42                | 100                                  | 42                        |          |          |
| 11/10/2021 | 1     | 4         | Buzzard | 1      | 12:05 | 10              |                | 0                        | 10               | 10                       |                | 0                        | 10                | 100                                  | 10                        |          |          |
| 11/10/2021 | 1     | 6         | Buzzard | 1      | 13:35 | 25              |                | 0                        | 25               | 25                       |                | 0                        | 25                | 100                                  | 25                        |          |          |
| 12/10/2021 | 1     | 8         | Buzzard | 1      | 08:25 | 58              |                | 0                        | 15               | 15                       | 43             | 43                       | 58                | 100                                  | 58                        |          |          |
| 12/10/2021 | 1     | 9         | Buzzard | 1      | 09:10 | 38              | 8              | 8                        | 30               | 30                       |                | 0                        | 38                | 100                                  | 38                        |          |          |
| 12/10/2021 | 1     | 12        | Buzzard | 1      | 10:15 | 45              |                | 0                        | 45               | 45                       |                | 0                        | 45                | 100                                  | 45                        |          |          |
| 12/10/2021 | 2     | 13        | Buzzard | 1      | 12:25 | 41              |                | 0                        | 41               | 41                       |                | 0                        | 41                | 100                                  | 41                        |          |          |
| 12/10/2021 | 2     | 14        | Buzzard | 1      | 13:45 | 33              |                | 0                        | 33               | 33                       |                | 0                        | 33                | 100                                  | 33                        |          |          |
| 08/11/2021 | 2     | 22        | Buzzard | 1      | 10:11 | 23              |                | 0                        |                  | 0                        | 23             | 23                       | 23                | 100                                  | 23                        |          |          |
| 08/11/2021 | 1     | 25        | Buzzard | 1      | 15:36 | 23              | 23             | 23                       |                  | 0                        |                | 0                        | 23                | 100                                  | 23                        |          |          |
| 08/11/2021 | 1     | 26        | Buzzard | 1      | 15:44 | 4               | 4              | 4                        |                  | 0                        |                | 0                        | 4                 | 100                                  | 4                         |          |          |
| 09/11/2021 | 1     | 28        | Buzzard | 1      | 08:36 | 32              |                | 0                        |                  | 0                        | 32             | 32                       | 32                | 100                                  | 32                        |          |          |
| 09/11/2021 | 2     | 30        | Buzzard | 1      | 14:35 | 22              |                | 0                        | 22               | 22                       |                | 0                        | 22                | 0                                    | 0                         |          |          |
| 09/11/2021 | 2     | 33        | Buzzard | 1      | 14:05 | 46              |                | 0                        | 46               | 46                       |                | 0                        | 46                | 100                                  | 46                        |          |          |
| 02/12/2021 | 1     | 31        | Buzzard | 1      | 09:20 | 23              |                | 0                        | 23               | 23                       |                | 0                        | 23                | 0                                    | 0                         |          |          |
| 02/12/2021 | 1     | 32        | Buzzard | 1      | 10:05 | 86              |                | 0                        | 60               | 60                       | 26             | 26                       | 86                | 100                                  | 86                        |          |          |
| 02/12/2021 | 2     | 34        | Buzzard | 1      | 15:15 | 41              |                | 0                        | 41               | 41                       |                | 0                        | 41                | 100                                  | 41                        |          |          |
| 02/12/2021 | 2     | 36        | Buzzard | 1      | 15:52 | 22              | 22             | 22                       |                  | 0                        |                | 0                        | 22                | 100                                  | 22                        |          |          |
| 03/12/2021 | 1     | 40        | Buzzard | 3      | 14:10 | 88              | 15             | 45                       | 30               | 90                       | 43             | 129                      | 264               | 100                                  | 264                       |          |          |
| 03/12/2021 | 1     | 41        | Buzzard | 1      | 16:10 | 27              |                | 0                        | 27               | 27                       |                | 0                        | 27                | 100                                  | 27                        |          |          |
| 03/01/2022 | 2     | 42        | Buzzard | 1      | 10:55 | 88              |                | 0                        |                  | 0                        | 88             | 88                       | 88                | 100                                  | 88                        |          |          |
| 03/01/2022 | 1     | 43        | Buzzard | 1      | 13:40 | 122             |                | 0                        |                  | 0                        | 122            | 122                      | 122               | 100                                  | 122                       |          |          |
| 03/01/2022 | 1     | 46        | Buzzard | 1      | 15:36 | 28              | 28             | 28                       |                  | 0                        |                | 0                        | 28                | 100                                  | 28                        |          |          |
| 03/01/2022 | 1     | 47        | Buzzard | 1      | 15:40 | 35              | 35             | 35                       |                  | 0                        |                | 0                        | 35                | 100                                  | 35                        |          |          |
| 04/01/2022 | 1     | 49        | Buzzard | 1      | 09:25 | 43              | 15             | 15                       | 28               | 28                       |                | 0                        | 43                | 100                                  | 43                        |          |          |
| 04/01/2022 | 1     | 51        | Buzzard | 1      | 10:58 | 58              |                | 0                        | 58               | 58                       |                | 0                        | 58                | 100                                  | 58                        |          |          |
| 04/01/2022 | 2     | 52        | Buzzard | 2      | 14:57 | 103             |                | 0                        |                  | 0                        | 103            | 206                      | 206               | 100                                  | 206                       |          |          |
| 04/01/2022 | 2     | 53        | Buzzard | 1      | 15:04 | 16              |                | 0                        | 16               | 16                       |                | 0                        | 16                | 100                                  | 16                        |          |          |
| 04/01/2022 | 2     | 55        | Buzzard | 1      | 15:35 | 38              |                | 0                        | 38               | 38                       |                | 0                        | 38                | 100                                  | 38                        |          |          |
| 04/01/2022 | 2     | 56        | Buzzard | 1      | 15:46 | 11              | 11             | 11                       |                  | 0                        |                | 0                        | 11                | 100                                  | 11                        |          |          |
| 04/01/2022 | 2     | 58        | Buzzard | 1      | 16:05 | 148             | 45             | 45                       | 103              | 103                      |                | 0                        | 148               | 100                                  | 148                       |          |          |
| 21/02/2022 | 1     | 60        | Buzzard | 1      | 09:10 | 69              |                | 0                        | 69               | 69                       |                | 0                        | 69                | 100                                  | 69                        |          |          |
| 21/02/2022 | 2     | 62        | Buzzard | 1      | 14:47 | 21              |                | 0                        | 21               | 21                       |                | 0                        | 21                | 100                                  | 21                        |          |          |
| 22/02/2022 | 2     | 63        | Buzzard | 2      | 08:40 | 102             |                | 0                        | 102              | 204                      |                | 0                        | 204               | 100                                  | 204                       |          |          |
| 22/02/2022 | 2     | 65        | Buzzard | 1      | 08:35 | 22              |                | 0                        | 22               | 22                       |                | 0                        | 22                | 100                                  | 22                        |          |          |
| 22/02/2022 | 2     | 67        | Buzzard | 1      | 09:05 | 18              | 18             | 18                       |                  | 0                        |                | 0                        | 18                | 18                                   | 3                         |          |          |
| 22/02/2022 | 2     | 68        | Buzzard | 3      | 09:50 | 48              |                | 0                        | 48               | 144                      |                | 0                        | 144               | 100                                  | 144                       |          |          |
| 22/02/2022 | 2     | 69        | Buzzard | 1      | 09:55 | 23              |                | 0                        | 23               | 23                       |                | 0                        | 23                | 100                                  | 23                        |          |          |

| Date       | VP No | Map label | Species | Number | Time  | Flight Duration | Band 1 (0-25m) | Total flight time Band 1 | Band 2 (25-180m) | Total flight time Band 2 | Band 3 (>180m) | Total flight time Band 3 | Total Flight Time | Proportion of flightline in viewshed | Time flight / In viewshed | Activity | Comments                                             |
|------------|-------|-----------|---------|--------|-------|-----------------|----------------|--------------------------|------------------|--------------------------|----------------|--------------------------|-------------------|--------------------------------------|---------------------------|----------|------------------------------------------------------|
| 22/02/2022 | 1     | 72        | Buzzard | 1      | 15:22 | 28              | 28             | 28                       |                  | 0                        |                | 0                        | 28                | 0                                    | 0                         |          |                                                      |
| 22/02/2022 | 1     | 73        | Buzzard | 1      | 15:30 | 40              |                | 0                        | 40               | 40                       |                | 0                        | 40                | 100                                  | 40                        |          |                                                      |
| 22/02/2022 | 1     | 74        | Buzzard | 1      | 16:08 | 65              |                | 0                        | 65               | 65                       |                | 0                        | 65                | 100                                  | 65                        |          |                                                      |
| 07/03/2022 | 1     | 79        | Buzzard | 1      | 08:21 | 8               |                | 0                        | 8                | 8                        |                | 0                        | 8                 | 100                                  | 8                         |          |                                                      |
| 07/03/2022 | 1     | 80        | Buzzard | 2      | 08:27 | 118             |                | 0                        |                  | 0                        | 118            | 236                      | 236               | 100                                  | 236                       |          |                                                      |
| 07/03/2022 | 1     | 81        | Buzzard | 1      | 09:10 | 52              |                | 0                        | 52               | 52                       |                | 0                        | 52                | 100                                  | 52                        |          |                                                      |
| 07/03/2022 | 2     | 82        | Buzzard | 1      | 13:45 | 153             |                | 0                        |                  | 0                        | 153            | 153                      | 153               | 100                                  | 153                       |          |                                                      |
| 08/03/2022 | 1     | 87        | Buzzard | 1      | 13:46 | 66              |                | 0                        | 66               | 66                       |                | 0                        | 66                | 100                                  | 66                        |          |                                                      |
| 08/03/2022 | 1     | 88        | Buzzard | 1      | 13:55 | 28              | 28             | 28                       |                  | 0                        |                | 0                        | 28                | 0                                    | 0                         |          |                                                      |
| 08/03/2022 | 1     | 90        | Buzzard | 1      | 15:15 | 101             |                | 0                        |                  | 0                        | 101            | 101                      | 101               | 100                                  | 101                       |          |                                                      |
| 08/03/2022 | 1     | 91        | Buzzard | 1      | 15:37 | 42              |                | 0                        | 42               | 42                       |                | 0                        | 42                | 100                                  | 42                        |          |                                                      |
| 08/03/2022 | 1     | 93        | Buzzard | 1      | 16:10 | 11              |                | 0                        | 11               | 11                       |                | 0                        | 11                | 100                                  | 11                        |          |                                                      |
| 10/04/2022 | 1     | 4         | Buzzard | 1      | 15:18 | 19              |                | 0                        | 19               | 19                       |                | 0                        | 19                | 100                                  | 19                        |          | Calling                                              |
| 10/04/2022 | 1     | 6         | Buzzard | 2      | 16:58 | 175             |                | 0                        |                  | 0                        | 175            | 350                      | 350               | 53                                   | 185                       |          | Soaring over north end of site                       |
| 11/04/2022 | 3     | 9         | Buzzard | 1      | 13:53 | 38              |                | 0                        | 38               | 38                       |                | 0                        | 38                | 0                                    | 0                         |          |                                                      |
| 12/04/2022 | 2     | 12        | Buzzard | 1      | 08:14 | 22              |                | 0                        | 22               | 22                       |                | 0                        | 22                | 56                                   | 12                        |          |                                                      |
| 12/04/2022 | 2     | 13        | Buzzard | 1      | 08:15 | 15              |                | 0                        | 15               | 15                       |                | 0                        | 15                | 10                                   | 2                         |          |                                                      |
| 13/04/2022 | 3     | 16        | Buzzard | 1      | 11:04 | 200             | 140            | 140                      | 60               | 60                       |                | 0                        | 200               | 6                                    | 12                        |          | Resident pair moved to north of site.                |
| 13/04/2022 | 3     | 17        | Buzzard | 1      | 12:01 | 10              |                | 0                        | 10               | 10                       |                | 0                        | 10                | 0                                    | 0                         |          | Calling female                                       |
| 19/05/2022 | 3     | 19        | Buzzard | 1      | 09:30 | 1340            |                | 0                        | 1340             | 1340                     |                | 0                        | 1340              | 0                                    | 0                         |          | Soaring & Hunting male bird                          |
| 19/05/2022 | 3     | 20        | Buzzard | 1      | 10:27 | 775             |                | 0                        | 775              | 775                      |                | 0                        | 775               | 0                                    | 0                         |          | Soaring & Hunting male bird                          |
| 19/05/2022 | 3     | 21        | Buzzard | 1      | 11:49 | 310             |                | 0                        | 310              | 310                      |                | 0                        | 310               | 43                                   | 134                       |          | Soaring & Hunting male bird                          |
| 19/05/2022 | 2     | 22        | Buzzard | 1      | 17:34 | 430             |                | 0                        | 430              | 430                      |                | 0                        | 430               | 0                                    | 0                         |          | Soaring & Hunting male bird                          |
| 21/05/2022 | 3     | 23        | Buzzard | 1      | 14:38 | 300             |                | 0                        | 300              | 300                      |                | 0                        | 300               | 0                                    | 0                         |          | Soaring & Hunting male bird, mobbed by Hooded Crows. |
| 21/05/2022 | 3     | 24        | Buzzard | 1      | 15:03 | 390             |                | 0                        | 390              | 390                      |                | 0                        | 390               | 0                                    | 0                         |          | Soaring & Hunting male bird                          |
| 21/05/2022 | 3     | 25        | Buzzard | 1      | 16:59 | 240             |                | 0                        | 120              | 120                      | 120            | 120                      | 240               | 0                                    | 0                         |          | Soaring & Hunting male bird                          |
| 31/05/2022 | 2     | 29        | Buzzard | 1      | 09:19 | 30              | 30             | 30                       |                  | 0                        |                | 0                        | 30                | 0                                    | 0                         |          | Carrying prey                                        |
| 31/05/2022 | 2     | 31        | Buzzard | 1      | 10:13 | 240             | 15             | 15                       | 225              | 225                      |                | 0                        | 240               | 0                                    | 0                         |          | Hunting through site                                 |
| 31/05/2022 | 2     | 32        | Buzzard | 1      | 10:59 | 940             |                | 0                        |                  | 0                        | 940            | 940                      | 940               | 0                                    | 0                         |          | Soaring, Calling & displaying bird.                  |
| 02/06/2022 | 3     | 33        | Buzzard | 1      | 06:27 | 36              | 36             | 36                       |                  | 0                        |                | 0                        | 36                | 0                                    | 0                         |          | Flew to perch                                        |
| 02/06/2022 | 3     | 34        | Buzzard | 1      | 07:38 | 32              | 32             | 32                       |                  | 0                        |                | 0                        | 32                | 44                                   | 14                        |          | Flew from perch                                      |
| 29/06/2022 | 1     | 35        | Buzzard | 1      | 17:46 | 1030            |                | 0                        |                  | 0                        | 1030           | 1030                     | 1030              | 79                                   | 818                       |          | High soaring                                         |
| 30/06/2022 | 2     | NA        | Buzzard | 2      | 13:55 | 0               |                | 0                        |                  | 0                        |                | 0                        | 0                 |                                      | 0                         |          | Two young in nest                                    |
| 02/07/2022 | 2     | 39        | Buzzard | 1      | 18:02 | 63              | 15             | 15                       | 48               | 48                       |                | 0                        | 63                | 0                                    | 0                         |          | Adult female alarm calling at Sparrowhawk            |
| 02/07/2022 | 2     | 40        | Buzzard | 1      | 19:42 | 13              | 13             | 13                       |                  | 0                        |                | 0                        | 13                | 0                                    | 0                         |          | Adult bringing in food.                              |
| 02/07/2022 | 3     | 41        | Buzzard | 1      | 14:36 | 13              | 13             | 13                       |                  | 0                        |                | 0                        | 13                | 0                                    | 0                         |          |                                                      |

| Date       | VP No | Map label | Species | Number | Time  | Flight Duration | Band 1 (0-25m) | Total flight time Band 1 | Band 2 (25-180m) | Total flight time Band 2 | Band 3 (>180m) | Total flight time Band 3 | Total Flight Time | Proportion of flightline in viewshed | Time flight / In viewshed | Activity   | Comments                                                               |
|------------|-------|-----------|---------|--------|-------|-----------------|----------------|--------------------------|------------------|--------------------------|----------------|--------------------------|-------------------|--------------------------------------|---------------------------|------------|------------------------------------------------------------------------|
| 10/08/2022 | 2     | 44        | Buzzard | 2      | 10:46 | 175             |                | 0                        | 175              | 350                      |                | 0                        | 350               | 0                                    | 0                         |            | Calling and soaring over site                                          |
| 10/08/2022 | 2     | 45        | Buzzard | 1      | 12:28 | 95              |                | 0                        |                  | 0                        | 95             | 95                       | 95                | 0                                    | 0                         |            | Chick calling for food high ove site                                   |
| 10/08/2022 | 1     | 46        | Buzzard | 1      | 13:34 | 1440            |                | 0                        |                  | 0                        | 1440           | 1440                     | 1440              | 46                                   | 664                       |            | Soaring high over site                                                 |
| 10/08/2022 | 1     | 47        | Buzzard | 1      | 15:01 | 1620            |                | 0                        |                  | 0                        | 1620           | 1620                     | 1620              | 47                                   | 755                       |            | Soaring high over site                                                 |
| 24/10/2022 | 1     | 69        | Buzzard | 1      | 18:28 | 45              | 20             | 20                       | 25               | 25                       | 0              | 0                        | 45                | 100                                  | 45                        | Hunting    | perched on tree for one minute                                         |
| 25/10/2022 | 1     | 1         | Buzzard | 1      | 11:35 | 75              | 30             | 30                       | 45               | 45                       | 0              | 0                        | 75                | 100                                  | 75                        | Travelling | Mobbed by Hooded Crows                                                 |
| 25/10/2022 | 1     | 2         | Buzzard | 1      | 14:52 | 110             | 15             | 15                       | 95               | 95                       | 0              | 0                        | 110               | 69                                   | 76                        | Hunting    |                                                                        |
| 26/10/2022 | 3     | 14        | Buzzard | 1      | 14:16 | 14              | 11             | 11                       | 3                | 3                        | 0              | 0                        | 14                | 100                                  | 14                        | Travelling | Flying low along treeline.                                             |
| 27/10/2022 | 2     | 10        | Buzzard | 1      | 15:30 | 80              | 0              | 0                        | 80               | 80                       | 0              | 0                        | 80                | 100                                  | 80                        | Soaring    |                                                                        |
| 10/11/2022 | 3     | 24        | Buzzard | 1      | 09:31 | 37              | 5              | 5                        | 32               | 32                       | 0              | 0                        | 37                | 100                                  | 37                        | Travelling |                                                                        |
| 11/11/2022 | 2     | 22        | Buzzard | 1      | 11:38 | 55              | 55             | 55                       | 0                | 0                        | 0              | 0                        | 55                | 100                                  | 55                        | Travelling |                                                                        |
| 11/11/2022 | 2     | 23        | Buzzard | 1      | 13:07 | 45              | 34             | 34                       | 11               | 11                       | 0              | 0                        | 45                | 5                                    | 2                         | Travelling |                                                                        |
| 11/11/2022 | 2     | 76        | Buzzard | 1      | 14:58 | 16              | 4              | 4                        | 12               | 12                       | 0              | 0                        | 16                | 100                                  | 16                        | Travelling |                                                                        |
| 12/11/2022 | 1     | 15        | Buzzard | 1      | 11:44 | 105             | 0              | 0                        | 105              | 105                      | 0              | 0                        | 105               | 100                                  | 105                       | Circling   |                                                                        |
| 12/11/2022 | 1     | 18        | Buzzard | 1      | 13:54 | 18              | 5              | 5                        | 13               | 13                       | 0              | 0                        | 18                | 100                                  | 18                        | Travelling |                                                                        |
| 04/12/2022 | 3     | 38        | Buzzard | 1      | 14:23 | 45              | 10             | 10                       | 35               | 35                       | 0              | 0                        | 45                | 100                                  | 45                        | Travelling | Adult                                                                  |
| 05/12/2022 | 1     | 27        | Buzzard | 1      | 12:09 | 40              | 0              | 0                        | 40               | 40                       | 0              | 0                        | 40                | 100                                  | 40                        | Travelling |                                                                        |
| 06/12/2022 | 2     | 35        | Buzzard | 1      | 14:28 | 65              | 65             | 65                       | 0                | 0                        | 0              | 0                        | 65                | 100                                  | 65                        | Travelling | Adult                                                                  |
| 03/02/2023 | 1     | 47        | Buzzard | 1      | 12:31 | 70              | 12             | 12                       | 58               | 58                       | 0              | 0                        | 70                | 82                                   | 57                        | Travelling |                                                                        |
| 07/02/2023 | 2     | 49        | Buzzard | 1      | 13:11 | 25              | 25             | 25                       | 0                | 0                        | 0              | 0                        | 25                | 100                                  | 25                        | Travelling | Female adult Perched on tree for 24 mins. Flushed off by tractors      |
| 07/02/2023 | 2     | 50        | Buzzard | 1      | 13:16 | 37              | 37             | 37                       | 0                | 0                        | 0              | 0                        | 37                | 93                                   | 34                        | Travelling | Male adultPerched on tree for 19 mins before flushjed off by tractors. |
| 07/02/2023 | 2     | 51        | Buzzard | 1      | 16:23 | 40              | 40             | 40                       | 0                | 0                        | 0              | 0                        | 40                | 100                                  | 40                        | Travelling | Flying low along hedgerow.                                             |
| 10/03/2023 | 1     | 58        | Buzzard | 1      | 12:28 | 25              | 10             | 10                       | 15               | 15                       | 0              | 0                        | 25                | 96                                   | 24                        | Travelling | Lost view behind treeline                                              |
| 10/03/2023 | 1     | 59        | Buzzard | 1      | 13:45 | 240             | 0              | 0                        | 240              | 240                      | 0              | 0                        | 240               | 32                                   | 77                        | Soaring    | Rising on thermals travelling east                                     |
| 12/03/2023 | 2     | 60        | Buzzard | 1      | 10:13 | 19              | 19             | 19                       | 0                | 0                        | 0              | 0                        | 19                | 0                                    | 0                         | Travelling |                                                                        |
| 22/05/2023 | 1     | 1         | Buzzard | 2      | 09:02 | 175             | 0              | 0                        | 90               | 180                      | 85             | 170                      | 350               | 0                                    | 0                         | Soaring    | Two BZ rising on thermal and mobbing each other                        |
| 22/05/2023 | 1     | 2         | Buzzard | 1      | 10:32 | 110             | 0              | 0                        | 110              | 110                      | 0              | 0                        | 110               | 89                                   | 97                        | Travelling | Circled on thermal then flew NE                                        |
| 22/05/2023 | 1     | 3         | Buzzard | 1      | 13:12 | 48              | 6              | 6                        | 42               | 42                       | 0              | 0                        | 48                | 100                                  | 48                        | Travelling | Dropped low over bog                                                   |
| 22/05/2023 | 1     | 4         | Buzzard | 1      | 14:25 | 75              | 0              | 0                        | 75               | 75                       | 0              | 0                        | 75                | 45                                   | 34                        | Travelling |                                                                        |
| 24/05/2023 | 2     | 5         | Buzzard | 2      | 13:57 | 200             | 40             | 80                       | 160              | 320                      | 0              | 0                        | 400               | 76                                   | 302                       | Soaring    | M & F pair mobbing Corvids over treeline then dropped behind it        |
| 24/05/2023 | 2     | 6         | Buzzard | 1      | 15:04 | 42              | 5              | 5                        | 37               | 37                       | 0              | 0                        | 42                | 21                                   | 9                         | Travelling | Adult Buzzard flew up from below treeline then flew East.              |

| Date       | VP No | Map label | Species | Number | Time  | Flight Duration | Band 1 (0-25m) | Total flight time Band 1 | Band 2 (25-180m) | Total flight time Band 2 | Band 3 (>180m) | Total flight time Band 3 | Total Flight Time | Proportion of flightline in viewshed | Time flight / In viewshed | Activity   | Comments                                                                                           |
|------------|-------|-----------|---------|--------|-------|-----------------|----------------|--------------------------|------------------|--------------------------|----------------|--------------------------|-------------------|--------------------------------------|---------------------------|------------|----------------------------------------------------------------------------------------------------|
| 24/05/2023 | 2     | 7         | Buzzard | 2      | 16:17 | 165             | 15             | 30                       | 150              | 300                      | 0              | 0                        | 330               | 82                                   | 271                       | Soaring    | M&F pair flew out of treeline to mob Ravens, then soared before dropping behind treeline           |
| 25/05/2023 | 3     | 8         | Buzzard | 2      | 10:28 | 143             | 0              | 0                        | 143              | 286                      | 0              | 0                        | 286               | 100                                  | 286                       | Soaring    | F&M pair soaring together                                                                          |
| 02/06/2023 | 2     | 9         | Buzzard | 1      | 09:23 | 22              | 4              | 4                        | 18               | 18                       | 0              | 0                        | 22                | 100                                  | 22                        | Travelling | Male adult flew north out of trees                                                                 |
| 02/06/2023 | 2     | 11        | Buzzard | 1      | 11:17 | 70              | 5              | 5                        | 65               | 65                       | 0              | 0                        | 70                | 100                                  | 70                        | Travelling | male adult Circled before flying into trees                                                        |
| 02/06/2023 | 2     | 12        | Buzzard | 1      | 12:25 | 55              | 0              | 0                        | 55               | 55                       | 0              | 0                        | 55                | 100                                  | 55                        | Travelling | female adult Flew out of trees circled and travelled north over bog                                |
| 02/06/2023 | 2     | 13        | Buzzard | 1      | 12:59 | 34              | 0              | 0                        | 34               | 34                       | 0              | 0                        | 34                | 93                                   | 32                        | Travelling | male adult                                                                                         |
| 02/06/2023 | 2     | 14        | Buzzard | 1      | 14:06 | 62              | 8              | 8                        | 54               | 54                       | 0              | 0                        | 62                | 41                                   | 26                        | Soaring    | Pair soaring together then dropped behind treeline                                                 |
| 02/06/2023 | 2     | 15        | Buzzard | 1      | 14:45 | 27              | 4              | 4                        | 23               | 23                       | 0              | 0                        | 27                | 100                                  | 27                        | Travelling | female adult Dropped into trees                                                                    |
| 21/06/2023 | 3     | 16        | Buzzard | 1      | 09:45 | 9               | 9              | 9                        | 0                | 0                        | 0              | 0                        | 9                 | 100                                  | 9                         | Travelling | Male adult flying low west along hedgerow                                                          |
| 21/06/2023 | 3     | 17        | Buzzard | 1      | 09:52 | 190             | 0              | 0                        | 190              | 190                      | 0              | 0                        | 190               | 72                                   | 137                       | Soaring    | Male adult circling on thermal and displaying. Lost view behind forestry flying SW                 |
| 04/07/2023 | 2     | 28        | Buzzard | 1      | 10:28 | 19              | 12             | 12                       | 7                | 7                        | 0              | 0                        | 19                | 100                                  | 19                        | Travelling |                                                                                                    |
| 04/07/2023 | 2     | 29        | Buzzard | 1      | 13:11 | 120             | 0              | 0                        | 120              | 120                      | 0              | 0                        | 120               | 0                                    | 0                         | Soaring    | BZ rising on thermal. Lost view behind trees as bird dropped lower flying West                     |
| 06/07/2023 | 1     | 18        | Buzzard | 1      | 11:22 | 65              | 0              | 0                        | 65               | 65                       | 0              | 0                        | 65                | 100                                  | 65                        | Travelling | Flew at 50 metres NE over bog                                                                      |
| 06/07/2023 | 1     | 20        | Buzzard | 1      | 12:41 | 50              | 0              | 0                        | 50               | 50                       | 0              | 0                        | 50                | 100                                  | 50                        | Travelling | Flew West along forestry, then lost view travelling NW over forestry.                              |
| 06/07/2023 | 1     | 21        | Buzzard | 1      | 16:10 | 190             | 0              | 0                        | 190              | 190                      | 0              | 0                        | 190               | 93                                   | 177                       | Soaring    |                                                                                                    |
| 08/07/2023 | 2     | 30        | Buzzard | 1      | 16:44 | 235             | 0              | 0                        | 235              | 235                      | 0              | 0                        | 235               | 100                                  | 235                       | Soaring    | Circling at 30 Metres before climbing to 100 metres plus, then dropped to join female and Juvenile |
| 08/07/2023 | 2     | 31        | Buzzard | 2      | 16:46 | 70              | 0              | 0                        | 70               | 140                      | 0              | 0                        | 140               | 100                                  | 140                       | Travelling | Adult female and Juvenile fledgling joined male in flight South                                    |
| 09/07/2023 | 1     | 22        | Buzzard | 2      | 10:20 | 340             | 35             | 70                       | 110              | 220                      | 195            | 390                      | 680               | 78                                   | 532                       | Soaring    | Adult female and fledged Juvenile soared on thermal to over 200 metres out of view.                |
| 09/07/2023 | 1     | 23        | Buzzard | 1      | 10:22 | 155             | 0              | 0                        | 155              | 155                      | 0              | 0                        | 155               | 100                                  | 155                       | Circling   | Circled over bog travelling North                                                                  |
| 09/07/2023 | 1     | 25        | Buzzard | 2      | 13:29 | 180             | 0              | 0                        | 50               | 100                      | 130            | 260                      | 360               | 0                                    | 0                         | Soaring    |                                                                                                    |
| 09/07/2023 | 1     | 27        | Buzzard | 1      | 13:56 | 174             | 0              | 0                        | 174              | 174                      | 0              | 0                        | 174               | 0                                    | 0                         | Soaring    |                                                                                                    |
| 07/08/2023 | 2     | 34        | Buzzard | 2      | 09:34 | 168             | 0              | 0                        | 168              | 336                      | 0              | 0                        | 336               | 0                                    | 0                         | Soaring    |                                                                                                    |

| Date       | VP No | Map label | Species       | Number | Time  | Flight Duration | Band 1 (0-25m) | Total flight time Band 1 | Band 2 (25-180m) | Total flight time Band 2 | Band 3 (>180m) | Total flight time Band 3 | Total Flight Time | Proportion of flightline in viewshed | Time flight / In viewshed | Activity        | Comments                                                                          |
|------------|-------|-----------|---------------|--------|-------|-----------------|----------------|--------------------------|------------------|--------------------------|----------------|--------------------------|-------------------|--------------------------------------|---------------------------|-----------------|-----------------------------------------------------------------------------------|
| 07/08/2023 | 2     | 35        | Buzzard       | 2      | 11:07 | 63              | 0              | 0                        | 63               | 126                      | 0              | 0                        | 126               | 84                                   | 106                       | Travelling      | Adult female flying with Juvenile                                                 |
| 07/08/2023 | 2     | 36        | Buzzard       | 1      | 12:05 | 50              | 0              | 0                        | 50               | 50                       | 0              | 0                        | 50                | 77                                   | 39                        | Travelling      | Lost from view behind trees over bog                                              |
| 12/09/2023 | 2     | 41        | Buzzard       | 1      | 11:50 | 33              | 7              | 7                        | 26               | 26                       | 0              | 0                        | 33                | 100                                  | 33                        | Travelling      | Lost view behind trees                                                            |
| 12/09/2023 | 2     | 42        | Buzzard       | 1      | 12:02 | 405             | 0              | 0                        | 330              | 330                      | 75             | 75                       | 405               | 85                                   | 345                       | Soaring         | Joined female and Juvenile rising on thermal in Westerly direction                |
| 12/09/2023 | 2     | 43        | Buzzard       | 2      | 12:04 | 370             | 0              | 0                        | 310              | 620                      | 60             | 120                      | 740               | 77                                   | 568                       | Soaring         | Adult female and Juvenile Joined second adult in flight                           |
| 12/09/2023 | 2     | 44        | Buzzard       | 1      | 13:18 | 71              | 14             | 14                       | 57               | 57                       | 0              | 0                        | 71                | 100                                  | 71                        | Travelling      |                                                                                   |
| 12/09/2023 | 2     | 45        | Buzzard       | 1      | 13:25 | 120             | 46             | 46                       | 74               | 74                       | 0              | 0                        | 120               | 100                                  | 120                       | Hunting         | Circled and hovered over field then travelled South                               |
| 12/09/2023 | 2     | 46        | Buzzard       | 1      | 15:43 | 49              | 39             | 39                       | 10               | 10                       | 0              | 0                        | 49                | 63                                   | 31                        | Travelling      |                                                                                   |
| 12/09/2023 | 2     | 47        | Buzzard       | 1      | 16:01 | 70              | 0              | 0                        | 70               | 70                       | 0              | 0                        | 70                | 100                                  | 70                        | Travelling      |                                                                                   |
| 12/09/2023 | 2     | 52        | Buzzard       | 1      | 18:08 | 27              | 10             | 10                       | 17               | 17                       | 0              | 0                        | 27                | 91                                   | 25                        | Travelling      |                                                                                   |
| 13/09/2023 | 1     | 39        | Buzzard       | 2      | 11:09 | 70              | 0              | 0                        | 70               | 140                      | 0              | 0                        | 140               | 100                                  | 140                       | Travelling      | Adult female and Juvenile flying South together                                   |
| 13/09/2023 | 1     | 40        | Buzzard       | 1      | 15:20 | 12              | 0              | 0                        | 12               | 12                       | 0              | 0                        | 12                | 0                                    | 0                         | Travelling      |                                                                                   |
| 11/04/2022 | 3     | 8         | Curlew        | 1      | 12:44 | 525             | 0              | 0                        | 300              | 300                      | 225            | 225                      | 525               | 50                                   | 264                       | Displaying bird | Either displaying or disturbed, lot of BZ activity seen in that area on S1 search |
| 22/05/2022 | 1     | 28        | Curlew        | 1      | 16:49 | 18              | 0              | 0                        | 18               | 18                       | 0              | 0                        | 18                | 0                                    | 0                         |                 | Escorting Lesser Black backed Gulls out of the conservation area                  |
| 09/11/2021 | 2     | 32        | Golden Plover | 1000   | 14:31 | 87              |                | 0                        |                  | 0                        | 87             | 87000                    | 87000             | 100                                  | 87000                     |                 |                                                                                   |
| 21/02/2022 | 1     | 61        | Golden Plover | 70     | 10:36 | 34              |                | 0                        | 34               | 2380                     |                | 0                        | 2380              | 100                                  | 2380                      |                 |                                                                                   |
| 21/02/2022 | 1     | 59        | Golden Plover | 150    | 07:52 | 18              |                | 0                        | 18               | 2700                     |                | 0                        | 2700              | 100                                  | 2700                      |                 |                                                                                   |
| 22/02/2022 | 1     | 75        | Golden Plover | 100    | 16:35 | 23              |                | 0                        | 23               | 2300                     |                | 0                        | 2300              | 100                                  | 2300                      |                 |                                                                                   |
| 22/02/2022 | 2     | 64        | Golden Plover | 100    | 08:53 | 14              |                | 0                        | 14               | 1400                     |                | 0                        | 1400              | 100                                  | 1400                      |                 |                                                                                   |
| 22/02/2022 | 2     | 66        | Golden Plover | 200    | 09:01 | 32              |                | 0                        | 32               | 6400                     |                | 0                        | 6400              | 100                                  | 6400                      |                 |                                                                                   |
| 07/03/2022 | 1     | 77        | Golden Plover | 25     | 08:02 | 48              |                | 0                        | 48               | 1200                     |                | 0                        | 1200              | 100                                  | 1200                      |                 |                                                                                   |
| 07/03/2022 | 1     | 78        | Golden Plover | 110    | 08:15 | 42              |                | 0                        | 42               | 4620                     |                | 0                        | 4620              | 100                                  | 4620                      |                 |                                                                                   |
| 08/03/2022 | 1     | 94        | Golden Plover | 100    | 16:11 | 23              |                | 0                        | 23               | 2300                     |                | 0                        | 2300              | 90                                   | 2064                      |                 |                                                                                   |
| 08/03/2022 | 1     | 92        | Golden Plover | 200    | 16:05 | 8               | 8              | 1600                     |                  | 0                        |                | 0                        | 1600              | 100                                  | 1600                      |                 |                                                                                   |
| 07/04/2022 | 3     | 2         | Golden Plover | 11     | 13:16 | 8               |                | 0                        | 8                | 88                       |                | 0                        | 88                | 0                                    | 0                         |                 |                                                                                   |
| 07/04/2022 | 2     | 1         | Golden Plover | 20     | 11:51 | 18              |                | 0                        | 18               | 360                      |                | 0                        | 360               | 0                                    | 0                         |                 |                                                                                   |
| 10/04/2022 | 1     | 5         | Golden Plover | 20     | 15:32 | 5               | 5              | 100                      |                  | 0                        |                | 0                        | 100               | 100                                  | 100                       |                 |                                                                                   |
| 11/04/2022 | 3     | 10        | Golden Plover | 8      | 13:53 | 13              |                | 0                        | 13               | 104                      |                | 0                        | 104               | 0                                    | 0                         |                 |                                                                                   |
| 11/04/2022 | 3     | 7         | Golden Plover | 14     | 11:58 | 5               |                | 0                        | 5                | 70                       |                | 0                        | 70                | 0                                    | 0                         |                 |                                                                                   |
| 12/04/2022 | 1     | 14        | Golden Plover | 4      | 18:01 | 18              |                | 0                        |                  | 0                        | 18             | 72                       | 72                | 100                                  | 72                        |                 | Small flock joining larger flock of 500+ off site                                 |
| 24/10/2022 | 1     | 68        | Golden Plover | 400    | 17:08 | 550             | 0              | 0                        | 0                | 0                        | 550            | 220000                   | 220000            | 0                                    | 0                         | Travelling      |                                                                                   |
| 25/10/2022 | 1     | 66        | Golden Plover | 75     | 08:24 | 45              | 0              | 0                        | 45               | 3375                     | 0              | 0                        | 3375              | 18                                   | 603                       | Travelling      |                                                                                   |
| 26/10/2022 | 3     | 72        | Golden Plover | 300    | 16:37 | 150             | 0              | 0                        | 120              | 36000                    | 30             | 9000                     | 45000             | 100                                  | 45000                     | Travelling      |                                                                                   |

| Date       | VP No | Map label | Species       | Number | Time  | Flight Duration | Band 1 (0-25m) | Total flight time Band 1 | Band 2 (25-180m) | Total flight time Band 2 | Band 3 (>180m) | Total flight time Band 3 | Total Flight Time | Proportion of flightline in viewshed | Time flight / In viewshed | Activity   | Comments                                                                                                                                             |
|------------|-------|-----------|---------------|--------|-------|-----------------|----------------|--------------------------|------------------|--------------------------|----------------|--------------------------|-------------------|--------------------------------------|---------------------------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26/10/2022 | 3     | 71        | Golden Plover | 500    | 16:43 | 95              | 0              | 0                        | 95               | 47500                    | 0              | 0                        | 47500             | 100                                  | 47500                     | Travelling |                                                                                                                                                      |
| 26/10/2022 | 3     | 74        | Golden Plover | 1500   | 18:20 | 485             | 0              | 0                        | 50               | 75000                    | 435            | 652500                   | 727500            | 41                                   | 295201                    | Travelling |                                                                                                                                                      |
| 26/10/2022 | 3     | 12        | Golden Plover | 2500   | 09:05 | 1800            | 0              | 0                        | 1800             | 4500000                  | 0              | 0                        | 4500000           | 100                                  | 4500000                   | Circling   | Similar flights observed throughout the entire duration of the survey.                                                                               |
| 26/10/2022 | 3     | 73        | Golden Plover | 4000   | 17:59 | 750             | 0              | 0                        | 100              | 400000                   | 650            | 2600000                  | 3000000           | 99                                   | 2976920                   | Travelling |                                                                                                                                                      |
| 27/10/2022 | 2     | 7         | Golden Plover | 75     | 11:29 | 40              | 0              | 0                        | 40               | 3000                     | 0              | 0                        | 3000              | 26                                   | 780                       | Travelling | joined existing flock                                                                                                                                |
| 27/10/2022 | 2     | 6         | Golden Plover | 250    | 11:23 | 45              | 0              | 0                        | 0                | 0                        | 45             | 11250                    | 11250             | 72                                   | 8125                      | Travelling | joined existing flock                                                                                                                                |
| 27/10/2022 | 2     | 8         | Golden Plover | 400    | 11:44 | 75              | 0              | 0                        | 75               | 30000                    | 0              | 0                        | 30000             | 100                                  | 30000                     | Travelling | joined existing flock                                                                                                                                |
| 27/10/2022 | 3     | 70        | Golden Plover | 400    | 10:02 | 180             | 0              | 0                        | 180              | 72000                    | 0              | 0                        | 72000             | 100                                  | 72000                     | Travelling | Lost view due to heavy mist.                                                                                                                         |
| 27/10/2022 | 2     | 4         | Golden Plover | 2500   | 10:51 | 2700            | 0              | 0                        | 1350             | 3375000                  | 1350           | 3375000                  | 6750000           | 23                                   | 1583715                   | Travelling | Flock of 2500 GP circling. Similar flights and numbers observed throughout the entire duration of the survey. Referenced on map two by hatched area. |
| 12/11/2022 | 1     | 19        | Golden Plover | 50     | 14:52 | 55              | 0              | 0                        | 55               | 2750                     | 0              | 0                        | 2750              | 100                                  | 2750                      | Travelling |                                                                                                                                                      |
| 12/11/2022 | 1     | 17        | Golden Plover | 120    | 12:23 | 70              | 0              | 0                        | 70               | 8400                     | 0              | 0                        | 8400              | 90                                   | 7585                      | Travelling |                                                                                                                                                      |
| 06/12/2022 | 2     | 34        | Golden Plover | 45     | 12:00 | 50              | 0              | 0                        | 50               | 2250                     | 0              | 0                        | 2250              | 99                                   | 2227                      | Travelling |                                                                                                                                                      |
| 02/03/2023 | 1     | 84        | Golden Plover | 60     | 17:28 | 85              | 0              | 0                        | 85               | 5100                     | 0              | 0                        | 5100              | 89                                   | 4525                      | Travelling |                                                                                                                                                      |
| 03/03/2023 | 1     | 82        | Golden Plover | 35     | 07:11 | 55              | 0              | 0                        | 55               | 1925                     | 0              | 0                        | 1925              | 71                                   | 1371                      | Travelling | Flying north at approx. 120 metres                                                                                                                   |
| 10/03/2023 | 1     | 56        | Golden Plover | 16     | 10:10 | 65              | 0              | 0                        | 65               | 1040                     | 0              | 0                        | 1040              | 62                                   | 646                       | Travelling |                                                                                                                                                      |
| 09/11/2021 | 2     | 29        | Hen Harrier   | 1      | 13:48 | 87              | 0              | 0                        | 87               | 87                       | 0              | 0                        | 87                | 100                                  | 87                        |            |                                                                                                                                                      |
| 30/06/2022 | 2     | 37        | Hen Harrier   | 1      | 15:14 | 15              | 15             | 15                       | 0                | 0                        | 0              | 0                        | 15                | 0                                    | 0                         |            |                                                                                                                                                      |
| 05/07/2022 | 3     | 43        | Hen Harrier   | 1      | 08:37 | 5               | 5              | 5                        | 0                | 0                        | 0              | 0                        | 5                 | 68                                   | 3                         |            | First of the turf cutters arrived shortly before sighting.                                                                                           |
| 07/02/2023 | 2     | 52        | Hen Harrier   | 1      | 17:10 | 32              | 32             | 32                       | 0                | 0                        | 0              | 0                        | 32                | 100                                  | 32                        | Travelling | Adult male flying low NE. Dropped low into scrub/ rushes possibly to roost.                                                                          |
| 07/02/2023 | 2     | 54        | Hen Harrier   | 1      | 17:29 | 28              | 28             | 28                       | 0                | 0                        | 0              | 0                        | 28                | 100                                  | 28                        | Hunting    | Adult female hunting along field margins.                                                                                                            |
| 11/10/2021 | 1     | 5         | Kestrel       | 1      | 12:15 | 91              |                | 0                        | 91               | 91                       |                | 0                        | 91                | 100                                  | 91                        |            |                                                                                                                                                      |
| 12/10/2021 | 1     | 10        | Kestrel       | 1      | 09:45 | 82              |                | 0                        | 30               | 30                       | 52             | 52                       | 82                | 100                                  | 82                        |            |                                                                                                                                                      |
| 12/10/2021 | 2     | 15        | Kestrel       | 1      | 13:45 | 23              |                | 0                        | 23               | 23                       |                | 0                        | 23                | 0                                    | 0                         |            |                                                                                                                                                      |
| 08/11/2021 | 2     | 23        | Kestrel       | 1      | 10:12 | 86              |                | 0                        | 86               | 86                       |                | 0                        | 86                | 100                                  | 86                        |            |                                                                                                                                                      |
| 09/11/2021 | 2     | 31        | Kestrel       | 1      | 14:16 |                 |                | 0                        |                  | 0                        |                | 0                        | 0                 | 100                                  | 0                         |            |                                                                                                                                                      |
| 02/12/2021 | 1     | 33        | Kestrel       | 1      | 10:15 | 72              |                | 0                        | 45               | 45                       | 27             | 27                       | 72                | 100                                  | 72                        |            |                                                                                                                                                      |
| 02/12/2021 | 2     | 35        | Kestrel       | 1      | 15:45 | 68              | 45             | 45                       | 15               | 15                       | 8              | 8                        | 68                | 100                                  | 68                        |            |                                                                                                                                                      |
| 02/12/2021 | 2     | 37        | Kestrel       | 1      | 16:13 | 92              |                | 0                        | 90               | 90                       | 2              | 2                        | 92                | 100                                  | 92                        |            |                                                                                                                                                      |
| 03/12/2021 | 2     | 39        | Kestrel       | 1      | 09:51 | 101             |                | 0                        | 30               | 30                       | 71             | 71                       | 101               | 122                                  | 123                       |            |                                                                                                                                                      |
| 03/01/2022 | 1     | 48        | Kestrel       | 1      | 15:48 | 112             | 35             | 35                       | 77               | 77                       |                | 0                        | 112               | 89                                   | 99                        |            |                                                                                                                                                      |
| 04/01/2022 | 2     | 54        | Kestrel       | 1      | 15:15 | 58              |                | 0                        | 58               | 58                       |                | 0                        | 58                | 31                                   | 18                        |            |                                                                                                                                                      |
| 04/01/2022 | 2     | 57        | Kestrel       | 1      | 16:00 | 41              |                | 0                        | 41               | 41                       |                | 0                        | 41                | 93                                   | 38                        |            |                                                                                                                                                      |
| 22/02/2022 | 2     | 70        | Kestrel       | 1      | 10:32 | 105             | 45             | 45                       | 60               | 60                       |                | 0                        | 105               | 100                                  | 105                       |            |                                                                                                                                                      |



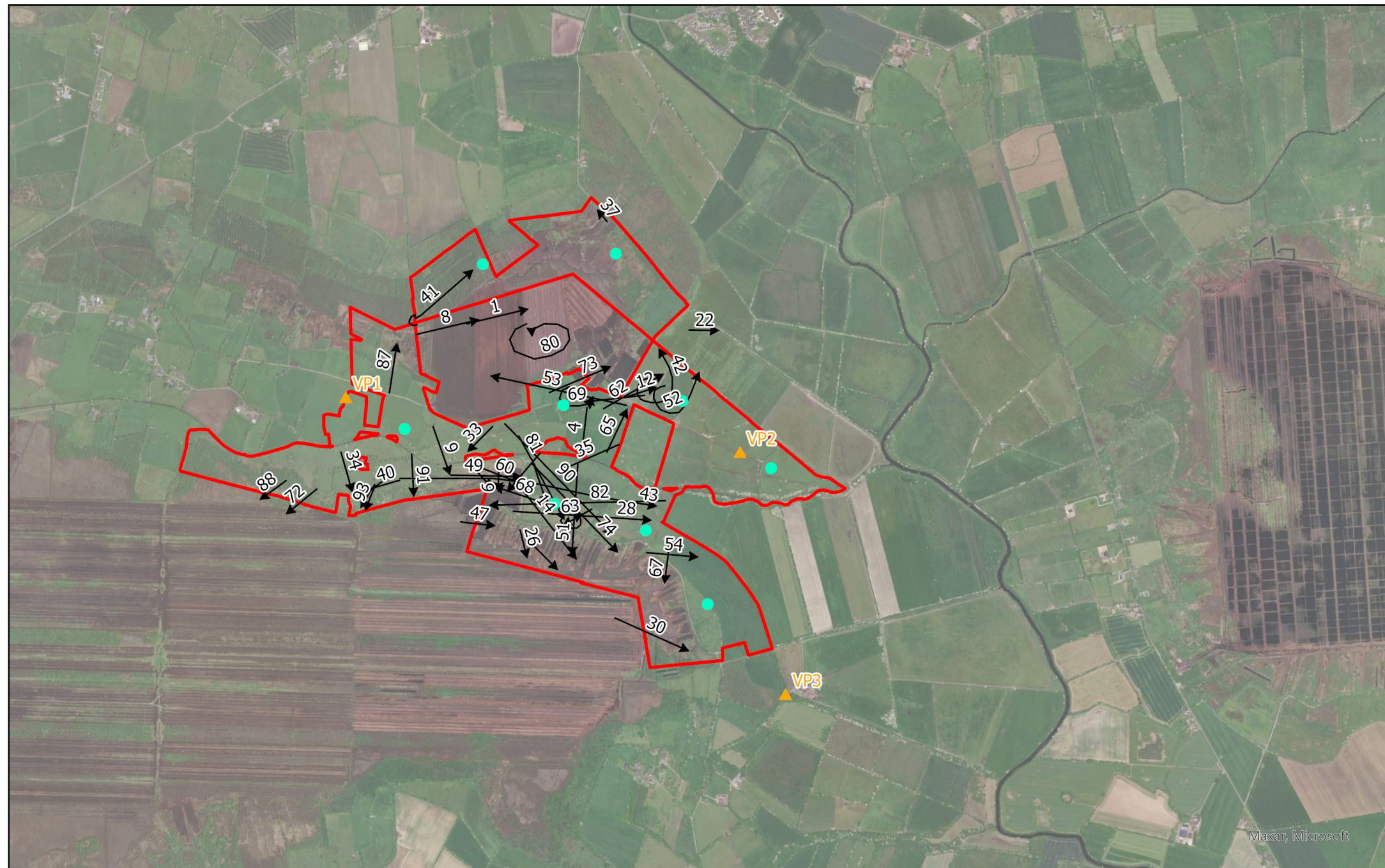
| Date       | VP No | Map label | Species   | Number | Time  | Flight Duration | Band 1 (0-25m) | Total flight time Band 1 | Band 2 (25-180m) | Total flight time Band 2 | Band 3 (>180m) | Total flight time Band 3 | Total Flight Time | Proportion of flightline in viewshed | Time flight / In viewshed | Activity   | Comments                                         |
|------------|-------|-----------|-----------|--------|-------|-----------------|----------------|--------------------------|------------------|--------------------------|----------------|--------------------------|-------------------|--------------------------------------|---------------------------|------------|--------------------------------------------------|
| 22/02/2022 | 1     | 71        | Kestrel   | 1      | 14:05 | 126             |                | 0                        |                  | 0                        | 126            | 126                      | 126               | 100                                  | 126                       |            |                                                  |
| 07/03/2022 | 2     | 83        | Kestrel   | 1      | 14:01 | 127             |                | 0                        | 127              | 127                      |                | 0                        | 127               | 79                                   | 101                       |            |                                                  |
| 08/03/2022 | 1     | 95        | Kestrel   | 1      | 16:12 | 106             |                | 0                        | 106              | 106                      |                | 0                        | 106               | 100                                  | 106                       |            |                                                  |
| 22/05/2022 | 2     | 27        | Kestrel   | 1      | 11:53 | 33              | 18             | 18                       | 15               | 15                       |                | 0                        | 33                | 0                                    | 0                         |            | Flying through, no behaviour displayed           |
| 26/10/2022 | 3     | 13        | Kestrel   | 1      | 12:40 | 75              | 10             | 10                       | 65               | 65                       | 0              | 0                        | 75                | 100                                  | 75                        | Hunting    |                                                  |
| 10/11/2022 | 3     | 25        | Kestrel   | 1      | 12:10 | 80              | 4              | 4                        | 76               | 76                       | 0              | 0                        | 80                | 100                                  | 80                        | Hunting    |                                                  |
| 11/11/2022 | 2     | 21        | Kestrel   | 1      | 1135  | 245             | 155            | 155                      | 90               | 90                       | 0              | 0                        | 245               | 100                                  | 245                       | Hunting    |                                                  |
| 11/11/2022 | 2     | 75        | Kestrel   | 1      | 14:46 | 150             | 150            | 150                      | 0                | 0                        | 0              | 0                        | 150               | 100                                  | 150                       | Hunting    | Made two failed kill attempts                    |
| 11/11/2022 | 2     | 79        | Kestrel   | 1      | 16:43 | 8               | 8              | 8                        | 0                | 0                        | 0              | 0                        | 8                 | 100                                  | 8                         | Travelling |                                                  |
| 06/12/2022 | 2     | 33        | Kestrel   | 1      | 11:55 | 390             | 340            | 340                      | 50               | 50                       | 0              | 0                        | 390               | 100                                  | 390                       | Hunting    | Male adult made two failed kill attempts         |
| 06/12/2022 | 2     | 36        | Kestrel   | 1      | 14:43 | 160             | 140            | 140                      | 20               | 20                       | 0              | 0                        | 160               | 100                                  | 160                       | Hunting    | male adult                                       |
| 10/01/2023 | 2     | 44        | Kestrel   | 1      | 13:17 | 190             | 140            | 140                      | 50               | 50                       | 0              | 0                        | 190               | 100                                  | 190                       | Hunting    | M/A made a successful kill and carried off prey. |
| 11/01/2023 | 1     | 39        | Kestrel   | 1      | 09:03 | 85              | 70             | 70                       | 15               | 15                       | 0              | 0                        | 85                | 100                                  | 85                        | Hunting    |                                                  |
| 10/03/2023 | 1     | 55        | Kestrel   | 1      | 10:07 | 140             | 55             | 55                       | 85               | 85                       | 0              | 0                        | 140               | 100                                  | 140                       | Hunting    | Dropped behind forestry                          |
| 12/03/2023 | 2     | 63        | Kestrel   | 1      | 13:27 | 510             | 170            | 170                      | 340              | 340                      | 0              | 0                        | 510               | 100                                  | 510                       | Hunting    | Adult male hunting between 15 and 35 metres.     |
| 12/03/2023 | 2     | 64        | Kestrel   | 1      | 14:54 | 11              | 11             | 11                       | 0                | 0                        | 0              | 0                        | 11                | 100                                  | 11                        | Travelling | Perched on tree for 20 seconds.                  |
| 02/06/2023 | 2     | 10        | Kestrel   | 1      | 10:14 | 86              | 71             | 71                       | 15               | 15                       | 0              | 0                        | 86                | 15                                   | 13                        | Hunting    | female adult                                     |
| 06/07/2023 | 1     | 19        | Kestrel   | 1      | 12:04 | 142             | 32             | 32                       | 110              | 110                      | 0              | 0                        | 142               | 100                                  | 142                       | Hunting    |                                                  |
| 08/07/2023 | 2     | 32        | Kestrel   | 1      | 19:20 | 258             | 173            | 173                      | 85               | 85                       | 0              | 0                        | 258               | 100                                  | 258                       | Hunting    | Adult male perched on tree for 40 seconds        |
| 09/07/2023 | 1     | 24        | Kestrel   | 1      | 12:11 | 17              | 0              | 0                        | 17               | 17                       | 0              | 0                        | 17                | 100                                  | 17                        | Hunting    |                                                  |
| 07/08/2023 | 2     | 33        | Kestrel   | 1      | 08:25 | 185             | 133            | 133                      | 52               | 52                       | 0              | 0                        | 185               | 100                                  | 185                       | Hunting    | Male adult perched on tree for 2 mins            |
| 08/08/2023 | 3     | 37        | Kestrel   | 1      | 08:17 | 17              | 0              | 0                        | 17               | 17                       | 0              | 0                        | 17                | 100                                  | 17                        | Travelling | Male Adult                                       |
| 08/11/2021 | 1     | 27        | Lapwing   | 150    | 15:55 | 123             |                | 0                        |                  | 0                        | 123            | 18450                    | 18450             | 62                                   | 11469                     |            |                                                  |
| 03/01/2022 | 1     | 45        | Lapwing   | 30     | 14:20 | 107             |                | 0                        |                  | 0                        | 107            | 3210                     | 3210              | 100                                  | 3210                      |            |                                                  |
| 07/04/2022 | 3     | 3         | Lapwing   | 1      | 13:25 | 27              |                | 0                        | 15               | 15                       | 12             | 12                       | 27                | 0                                    | 0                         |            |                                                  |
| 06/12/2022 | 2     | 32        | Lapwing   | 13     | 10:27 | 35              | 0              | 0                        | 35               | 455                      | 0              | 0                        | 455               | 4                                    | 16                        | Travelling |                                                  |
| 11/01/2023 | 1     | 40        | Lapwing   | 17     | 09:53 | 40              | 0              | 0                        | 40               | 680                      | 0              | 0                        | 680               | 90                                   | 610                       | Travelling |                                                  |
| 12/03/2023 | 2     | 62        | Lapwing   | 8      | 12:35 | 13              | 8              | 64                       | 5                | 40                       | 0              | 0                        | 104               | 0                                    | 0                         | Travelling | Flock circled south and dropped behind treeline  |
| 13/11/2022 | 1     | 81        | Mallard   | 2      | 08:40 | 19              | 0              | 0                        | 19               | 38                       | 0              | 0                        | 38                | 100                                  | 38                        | Travelling | Male and female flying NE over bog.              |
| 02/12/2021 | 2     | 38        | Merlin    | 1      | 16:35 | 23              | 15             | 15                       | 8                | 8                        | 0              | 0                        | 23                | 100                                  | 23                        |            |                                                  |
| 08/03/2022 | 2     | 84        | Merlin    | 1      | 08:43 | 23              | 23             | 23                       | 0                | 0                        | 0              | 0                        | 23                | 100                                  | 23                        |            |                                                  |
| 08/11/2021 | 2     | 19        | Peregrine | 1      | 08:53 | 41              | 15             | 15                       | 26               | 26                       | 0              | 0                        | 41                | 100                                  | 41                        |            |                                                  |
| 08/03/2022 | 2     | 86        | Peregrine | 1      | 09:49 | 38              | 0              | 0                        | 30               | 30                       | 8              | 8                        | 38                | 0                                    | 0                         |            |                                                  |
| 11/10/2021 | 2     | 2         | Snipe     | 1      | 09:05 | 28              | 0              | 0                        | 28               | 28                       | 0              | 0                        | 28                | 0                                    | 0                         |            |                                                  |
| 11/10/2021 | 1     | 7         | Snipe     | 1      | 13:20 | 34              | 15             | 15                       | 15               | 15                       | 4              | 4                        | 34                | 100                                  | 34                        |            |                                                  |
| 12/10/2021 | 1     | 11        | Snipe     | 1      | 10:15 | 16              | 0              | 0                        | 16               | 16                       | 0              | 0                        | 16                | 100                                  | 16                        |            |                                                  |
| 12/10/2021 | 2     | 16        | Snipe     | 1      | 13:50 | 4               | 0              | 0                        | 4                | 4                        | 0              | 0                        | 4                 | 59                                   | 2                         |            |                                                  |

| Date       | VP No | Map label | Species     | Number | Time  | Flight Duration | Band 1 (0-25m) | Total flight time Band 1 | Band 2 (25-180m) | Total flight time Band 2 | Band 3 (>180m) | Total flight time Band 3 | Total Flight Time | Proportion of flightline in viewshed | Time flight / In viewshed | Activity           | Comments                                             |
|------------|-------|-----------|-------------|--------|-------|-----------------|----------------|--------------------------|------------------|--------------------------|----------------|--------------------------|-------------------|--------------------------------------|---------------------------|--------------------|------------------------------------------------------|
| 08/11/2021 | 2     | 17        | Snipe       | 1      | 07:57 | 8               | 0              | 0                        | 8                | 8                        | 0              | 0                        | 8                 | 100                                  | 8                         |                    |                                                      |
| 08/11/2021 | 2     | 18        | Snipe       | 1      | 08:25 | 11              | 0              | 0                        | 11               | 11                       | 0              | 0                        | 11                | 100                                  | 11                        |                    |                                                      |
| 03/01/2022 | 1     | 44        | Snipe       | 1      | 13:43 | 8               | 0              | 0                        | 8                | 8                        | 0              | 0                        | 8                 | 100                                  | 8                         |                    |                                                      |
| 04/01/2022 | 1     | 50        | Snipe       | 1      | 09:31 | 22              | 15             | 15                       | 7                | 7                        | 0              | 0                        | 22                | 100                                  | 22                        |                    |                                                      |
| 07/03/2022 | 1     | 76        | Snipe       | 1      | 07:40 | 11              | 0              | 0                        | 11               | 11                       | 0              | 0                        | 11                | 100                                  | 11                        |                    |                                                      |
| 08/03/2022 | 2     | 85        | Snipe       | 2      | 09:48 | 12              | 12             | 24                       | 0                | 0                        | 0              | 0                        | 24                | 96                                   | 23                        |                    |                                                      |
| 25/10/2022 | 1     | 65        | Snipe       | 4      | 07:47 | 33              | 0              | 0                        | 33               | 132                      | 0              | 0                        | 132               | 100                                  | 132                       | Travelling         |                                                      |
| 25/10/2022 | 1     | 67        | Snipe       | 11     | 08:30 | 28              | 0              | 0                        | 28               | 308                      | 0              | 0                        | 308               | 96                                   | 295                       | Travelling         |                                                      |
| 12/09/2023 | 2     | 53        | Snipe       | 2      | 19:54 | 21              | 21             | 42                       | 0                | 0                        | 0              | 0                        | 42                | 17                                   | 7                         | Travelling         |                                                      |
| 14/09/2023 | 3     | 55        | Snipe       | 2      | 19:50 | 15              | 0              | 0                        | 15               | 30                       | 0              | 0                        | 30                | 100                                  | 30                        | Travelling         |                                                      |
| 14/09/2023 | 3     | 56        | Snipe       | 1      | 20:02 | 18              | 0              | 0                        | 18               | 18                       | 0              | 0                        | 18                | 59                                   | 11                        | Travelling         |                                                      |
| 08/11/2021 | 2     | 20        | Sparrowhawk | 1      | 09:15 | 23              | 23             | 23                       | 0                | 0                        | 0              | 0                        | 23                | 100                                  | 23                        |                    |                                                      |
| 08/11/2021 | 1     | 24        | Sparrowhawk | 1      | 14:40 | 28              | 0              | 0                        | 28               | 28                       | 0              | 0                        | 28                | 100                                  | 28                        |                    |                                                      |
| 08/03/2022 | 1     | 89        | Sparrowhawk | 1      | 13:57 | 58              | 58             | 58                       | 0                | 0                        | 0              | 0                        | 58                | 100                                  | 58                        |                    |                                                      |
| 11/04/2022 | 3     | 11        | Sparrowhawk | 1      | 14:07 | 20              | 0              | 0                        | 0                | 0                        | 20             | 20                       | 20                | 0                                    | 0                         |                    | Hunting high over site                               |
| 13/04/2022 | 3     | 15        | Sparrowhawk | 1      | 10:47 | 695             | 0              | 0                        | 0                | 0                        | 695            | 695                      | 695               | 20                                   | 141                       |                    | Soaring / displaying female                          |
| 13/04/2022 | 3     | 18        | Sparrowhawk | 1      | 12:28 | 30              | 30             | 30                       | 0                | 0                        | 0              | 0                        | 30                | 0                                    | 0                         |                    | Low flight at speed into forest, probable nest area. |
| 21/05/2022 | 3     | 26        | Sparrowhawk | 1      | 16:59 | 240             | 0              | 0                        | 0                | 0                        | 240            | 240                      | 240               | 0                                    | 0                         |                    | Soaring bird                                         |
| 31/05/2022 | 2     | 30        | Sparrowhawk | 1      | 09:47 | 15              | 15             | 15                       | 0                | 0                        | 0              | 0                        | 15                | 0                                    | 0                         |                    | Hunting through site                                 |
| 02/07/2022 | 2     | 38        | Sparrowhawk | 1      | 17:58 | 9               | 9              | 9                        | 0                | 0                        | 0              | 0                        | 9                 | 0                                    | 0                         |                    |                                                      |
| 03/07/2022 | 1     | 42        | Sparrowhawk | 1      | 16:44 | 7               | 7              | 7                        | 0                | 0                        | 0              | 0                        | 7                 | 100                                  | 7                         |                    |                                                      |
| 25/10/2022 | 1     | 3         | Sparrowhawk | 1      | 16:10 | 12              | 12             | 12                       | 0                | 0                        | 0              | 0                        | 12                | 100                                  | 12                        | Travelling         |                                                      |
| 26/10/2022 | 3     | 11        | Sparrowhawk | 1      | 09:01 | 17              | 17             | 17                       | 0                | 0                        | 0              | 0                        | 17                | 100                                  | 17                        | Hunting            | Observed on approach to VP ( Female Adult)           |
| 27/10/2022 | 2     | 5         | Sparrowhawk | 1      | 11:06 | 14              | 14             | 14                       | 0                | 0                        | 0              | 0                        | 14                | 100                                  | 14                        | Hunting            | Female Adult                                         |
| 27/10/2022 | 2     | 9         | Sparrowhawk | 1      | 13:48 | 23              | 23             | 23                       | 0                | 0                        | 0              | 0                        | 23                | 21                                   | 5                         | Hunting            | Female Adult                                         |
| 11/11/2022 | 2     | 20        | Sparrowhawk | 1      | 10:02 | 40              | 40             | 40                       | 0                | 0                        | 0              | 0                        | 40                | 22                                   | 9                         | Hunting passerines |                                                      |
| 11/11/2022 | 2     | 77        | Sparrowhawk | 1      | 15:23 | 27              | 27             | 27                       | 0                | 0                        | 0              | 0                        | 27                | 71                                   | 19                        | Travelling         |                                                      |
| 11/11/2022 | 2     | 78        | Sparrowhawk | 1      | 15:41 | 33              | 33             | 33                       | 0                | 0                        | 0              | 0                        | 33                | 100                                  | 33                        | Travelling         | Perched on post for 50 seconds                       |
| 12/11/2022 | 1     | 16        | Sparrowhawk | 1      | 12:07 | 12              | 12             | 12                       | 0                | 0                        | 0              | 0                        | 12                | 79                                   | 10                        | Travelling         |                                                      |
| 13/11/2022 | 1     | 80        | Sparrowhawk | 1      | 07:52 | 21              | 21             | 21                       | 0                | 0                        | 0              | 0                        | 21                | 100                                  | 21                        | Travelling         |                                                      |
| 04/12/2022 | 3     | 37        | Sparrowhawk | 1      | 10:17 | 10              | 10             | 10                       | 0                | 0                        | 0              | 0                        | 10                | 98                                   | 10                        | Hunting            | Hunting passerines along hedgerow ( male adult)      |
| 05/12/2022 | 1     | 26        | Sparrowhawk | 1      | 10:34 | 25              | 25             | 25                       | 0                | 0                        | 0              | 0                        | 25                | 99                                   | 25                        | Hunting            | Hunting passerines ( Female adult)                   |
| 05/12/2022 | 1     | 28        | Sparrowhawk | 1      | 13:55 | 25              | 25             | 25                       | 0                | 0                        | 0              | 0                        | 25                | 100                                  | 25                        | Travelling         | Male adult                                           |
| 06/12/2022 | 2     | 31        | Sparrowhawk | 1      | 10:03 | 24              | 24             | 24                       | 0                | 0                        | 0              | 0                        | 24                | 49                                   | 12                        | Hunting            | Hunting passerines along hedgerow ( female adult)    |
| 10/01/2023 | 2     | 42        | Sparrowhawk | 1      | 09:40 | 16              | 16             | 16                       | 0                | 0                        | 0              | 0                        | 16                | 37                                   | 6                         | Travelling         | F/A                                                  |
| 10/01/2023 | 2     | 43        | Sparrowhawk | 1      | 12:46 | 30              | 30             | 30                       | 0                | 0                        | 0              | 0                        | 30                | 40                                   | 12                        | Travelling         | F/A                                                  |
| 10/01/2023 | 2     | 45        | Sparrowhawk | 1      | 13:23 | 28              | 28             | 28                       | 0                | 0                        | 0              | 0                        | 28                | 83                                   | 23                        | Hunting            | F/A Chased flock of Linnet                           |



| Date       | VP No | Map label | Species      | Number | Time  | Flight Duration | Band 1 (0-25m) | Total flight time Band 1 | Band 2 (25-180m) | Total flight time Band 2 | Band 3 (>180m) | Total flight time Band 3 | Total Flight Time | Proportion of flightline in viewshed | Time flight / In viewshed | Activity   | Comments                                                     |
|------------|-------|-----------|--------------|--------|-------|-----------------|----------------|--------------------------|------------------|--------------------------|----------------|--------------------------|-------------------|--------------------------------------|---------------------------|------------|--------------------------------------------------------------|
| 11/01/2023 | 1     | 41        | Sparrowhawk  | 1      | 13:22 | 19              | 19             | 19                       | 0                | 0                        | 0              | 0                        | 19                | 100                                  | 19                        | Hunting    |                                                              |
| 03/02/2023 | 1     | 46        | Sparrowhawk  | 1      | 09:13 | 9               | 9              | 9                        | 0                | 0                        | 0              | 0                        | 9                 | 97                                   | 9                         | Hunting    | Male adult Chasing Passerines                                |
| 03/02/2023 | 1     | 48        | Sparrowhawk  | 1      | 13:10 | 15              | 15             | 15                       | 0                | 0                        | 0              | 0                        | 15                | 71                                   | 11                        | Travelling | Male adult Flying low NW along hedgerow                      |
| 07/02/2023 | 2     | 53        | Sparrowhawk  | 1      | 17:10 | 7               | 7              | 7                        | 0                | 0                        | 0              | 0                        | 7                 | 100                                  | 7                         | Mobbing    | Mobbe male HH.                                               |
| 02/03/2023 | 1     | 83        | Sparrowhawk  | 1      | 16:34 | 20              | 20             | 20                       | 0                | 0                        | 0              | 0                        | 20                | 100                                  | 20                        | Travelling |                                                              |
| 12/03/2023 | 2     | 61        | Sparrowhawk  | 1      | 12:33 | 22              | 22             | 22                       | 0                | 0                        | 0              | 0                        | 22                | 82                                   | 18                        | Travelling | Female adult flying low along fence line                     |
| 09/07/2023 | 1     | 26        | Sparrowhawk  | 1      | 13:31 | 13              | 13             | 13                       | 0                | 0                        | 0              | 0                        | 13                | 97                                   | 13                        | Travelling | Female adult brief chase of passerines                       |
| 08/08/2023 | 3     | 38        | Sparrowhawk  | 1      | 12:02 | 12              | 12             | 12                       | 0                | 0                        | 0              | 0                        | 12                | 100                                  | 12                        | Travelling | Female Adult                                                 |
| 14/09/2023 | 3     | 54        | Sparrowhawk  | 1      | 17:55 | 22              | 22             | 22                       | 0                | 0                        | 0              | 0                        | 22                | 85                                   | 19                        | Travelling | Female Juvenile perched on tree then flew West into forestry |
| 08/11/2021 | 2     | 21        | Whooper Swan | 4      | 10:05 | 51              | 51             | 204                      | 0                | 0                        | 0              | 0                        | 204               | 100                                  | 204                       |            |                                                              |
| 05/12/2022 | 1     | 29        | Whooper Swan | 7      | 16:21 | 65              | 0              | 0                        | 65               | 455                      | 0              | 0                        | 455               | 56                                   | 253                       | Travelling |                                                              |
| 10/03/2023 | 1     | 57        | Whooper Swan | 8      | 10:16 | 40              | 0              | 0                        | 40               | 320                      | 0              | 0                        | 320               | 0                                    | 0                         | Travelling | Flying at approx 90 metres                                   |
| 11/10/2021 | 2     | 3         | Woodcock     | 1      | 08:55 | 15              | 7              | 7                        | 8                | 8                        |                | 0                        | 15                | 100                                  | 15                        |            |                                                              |
| 05/12/2022 | 1     | 30        | Woodcock     | 1      | 16:28 | 9               | 9              | 9                        | 0                | 0                        | 0              | 0                        | 9                 | 80                                   | 7                         | Travelling | flying low over hedgerow                                     |

# Buzzard: Winter 2021-22



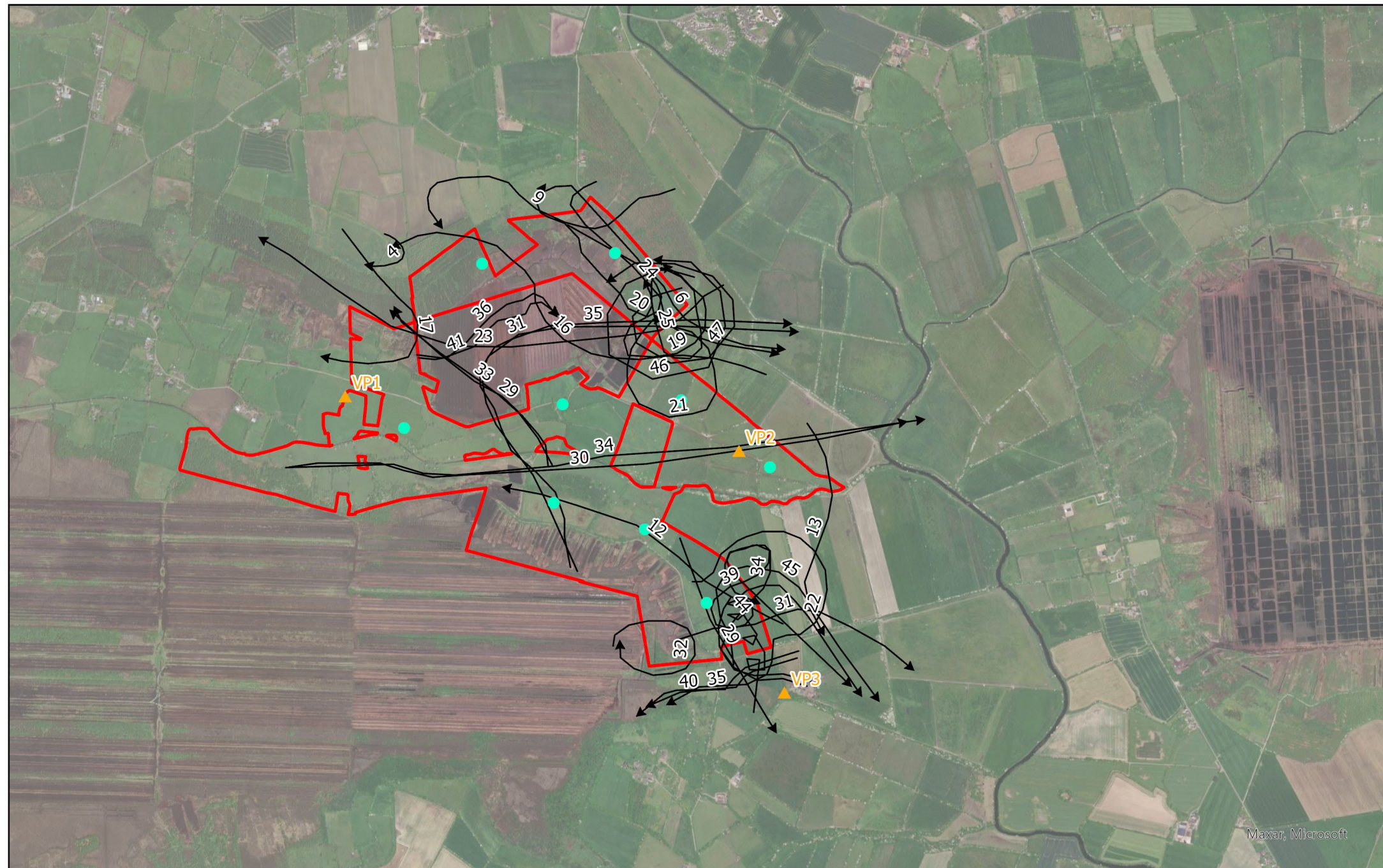
- ▲ Vantage Point Locations      → Buzzard flightline
- Proposed Turbine Locations      □ Proposed Windfarm Boundary

0      0.4      0.8      1.6 km

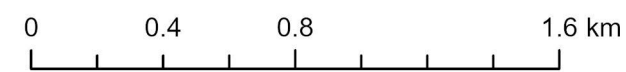




# Buzzard: Summer 2022

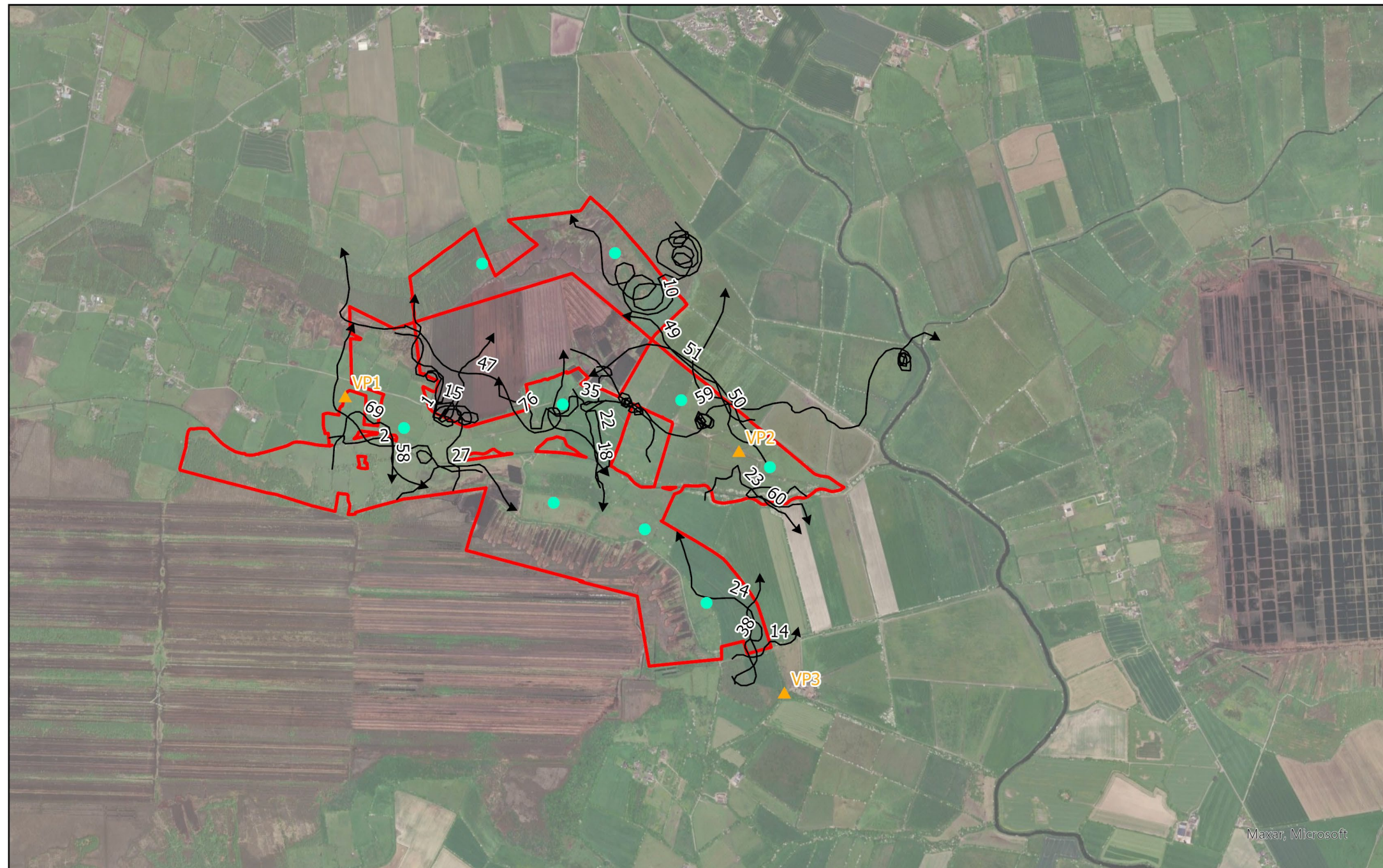


- ▲ Vantage Point Locations      → Buzzard
- Proposed Turbine Locations      □ Proposed Windfarm Boundary





# Buzzard: Winter 2022-23

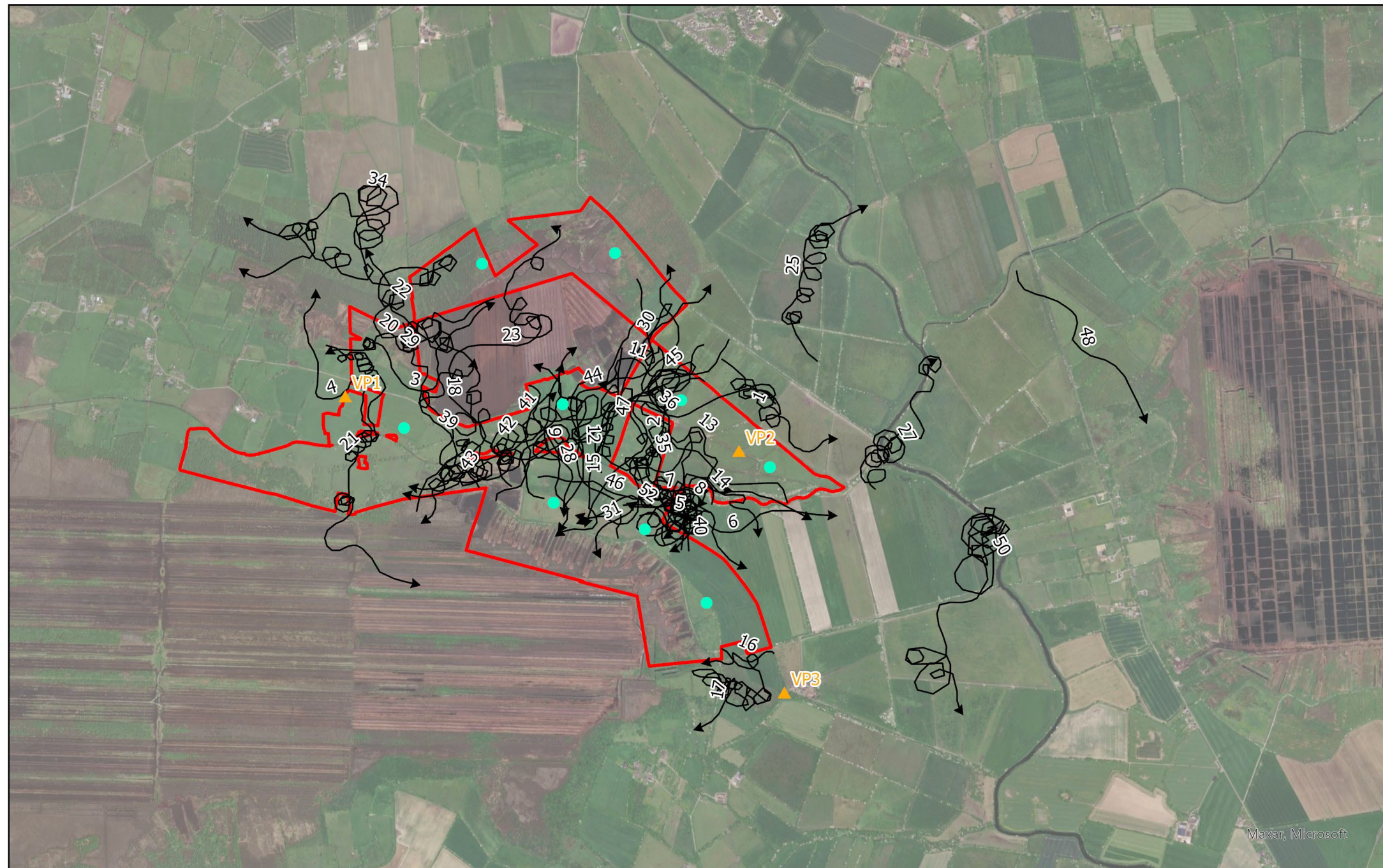


- ▲ Vantage Point Locations      → Buzzard
- Proposed Turbine Locations      □ Proposed Windfarm Boundary

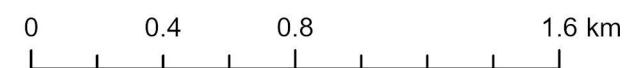




# Buzzard: Summer 2023



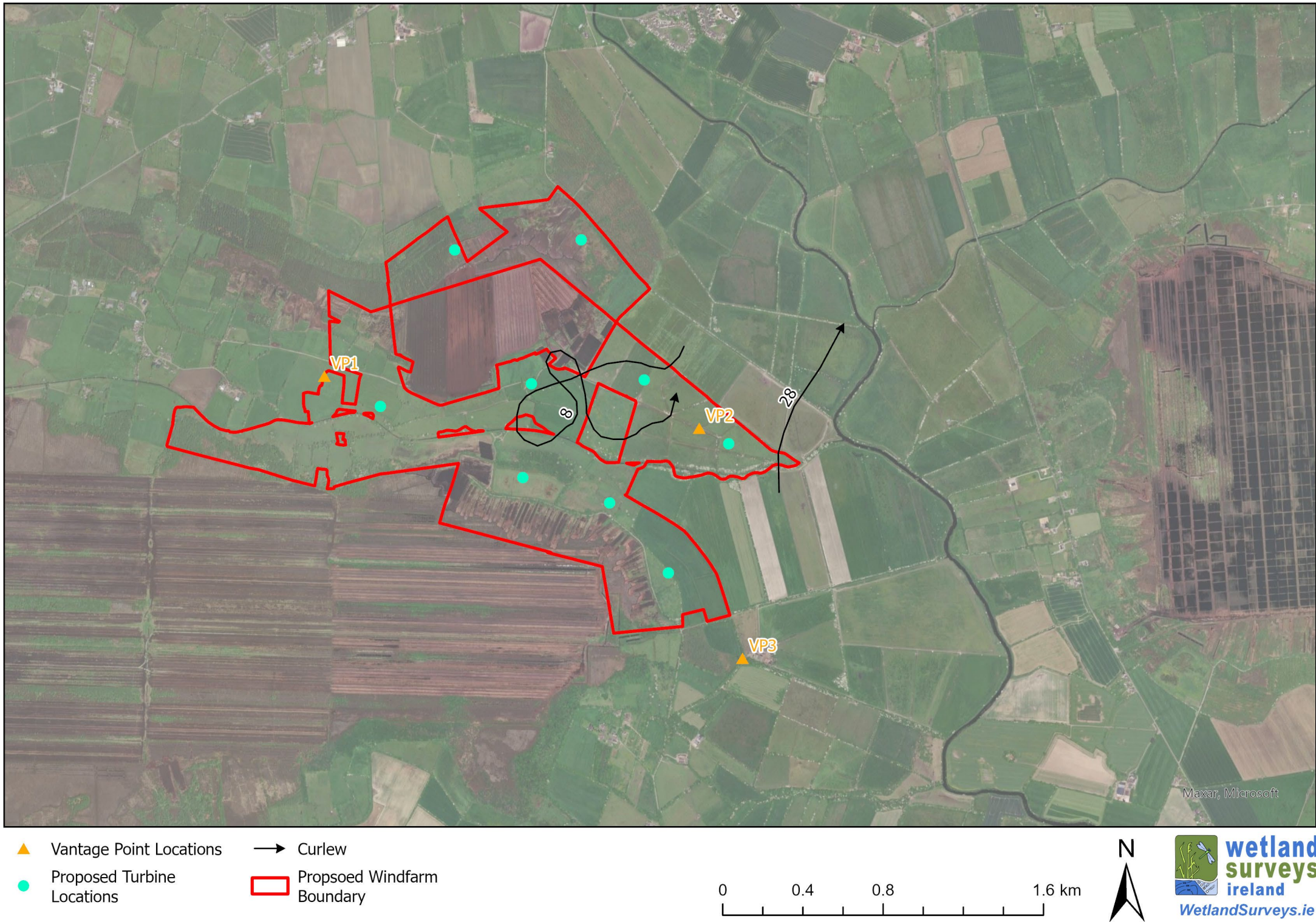
- ▲ Vantage Point Locations      → Buzzard
- Proposed Turbine Locations      □ Proposed Windfarm Boundary



Maxar, Microsoft

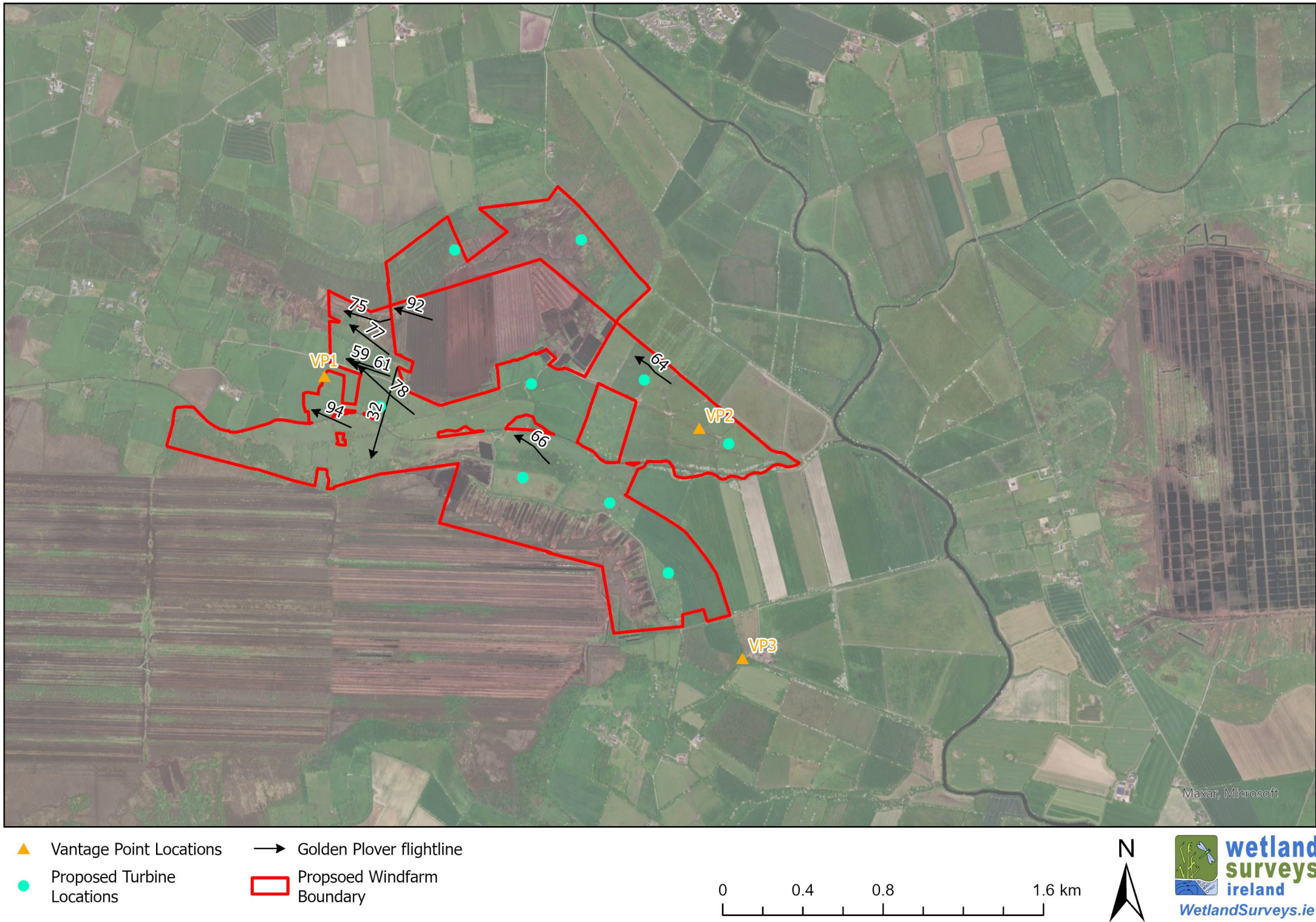


Curlew: Summer 2022





Golden Plover: Winter 2021-22



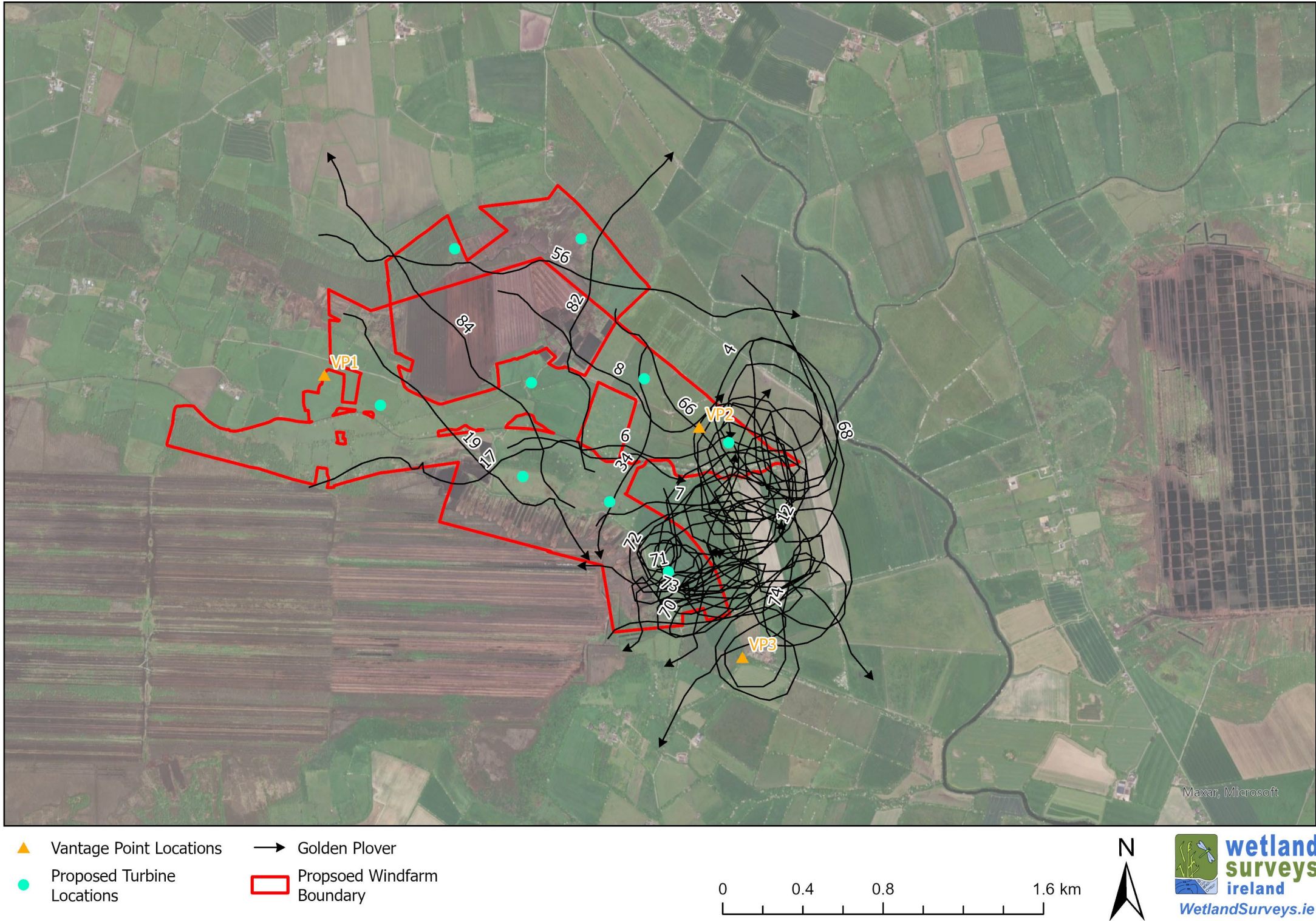


Golden Plover (wintering): Summer 2022 (April)



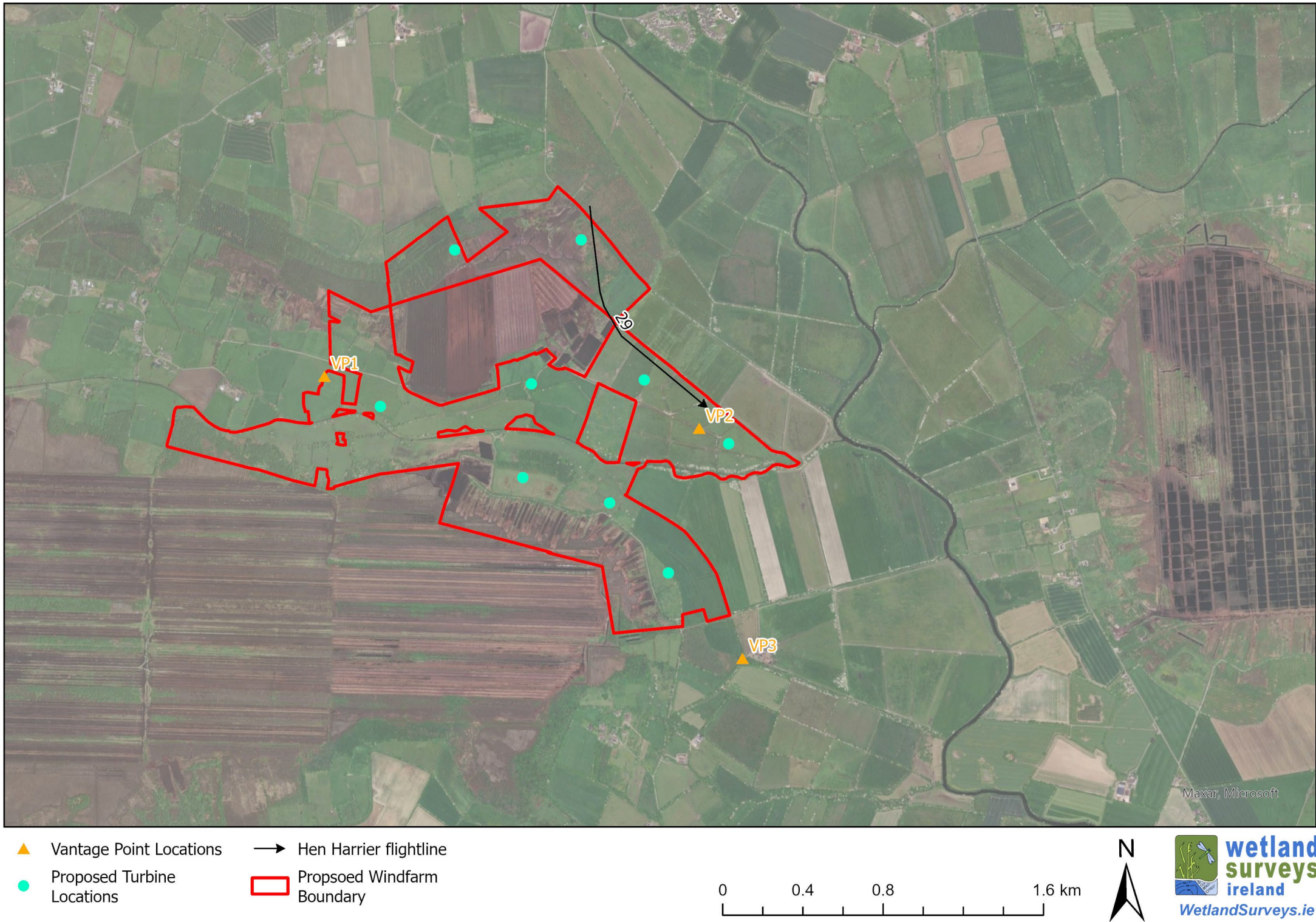


Golden Plover (wintering): Winter 22-23



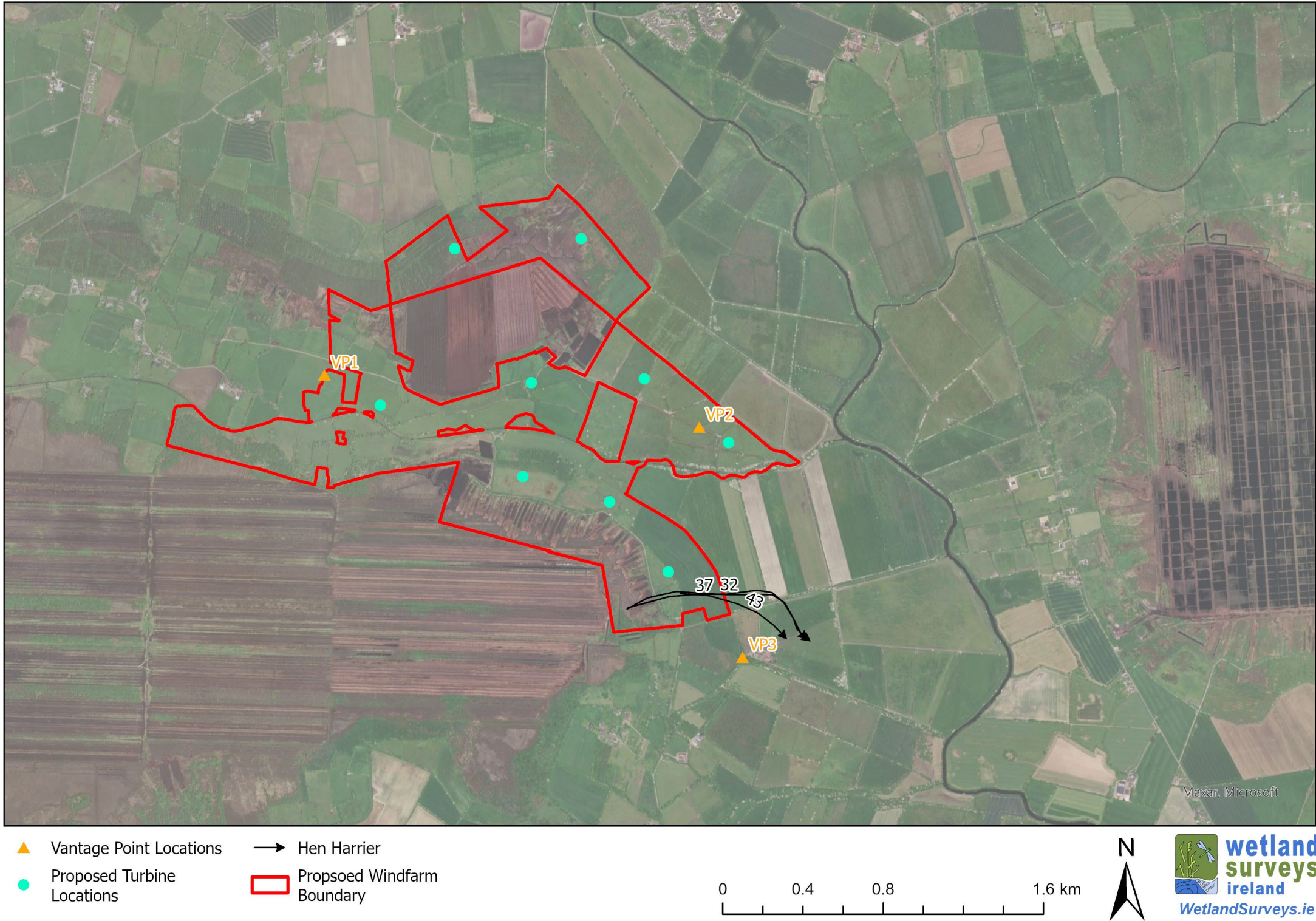


Hen Harrier: Winter 21-22



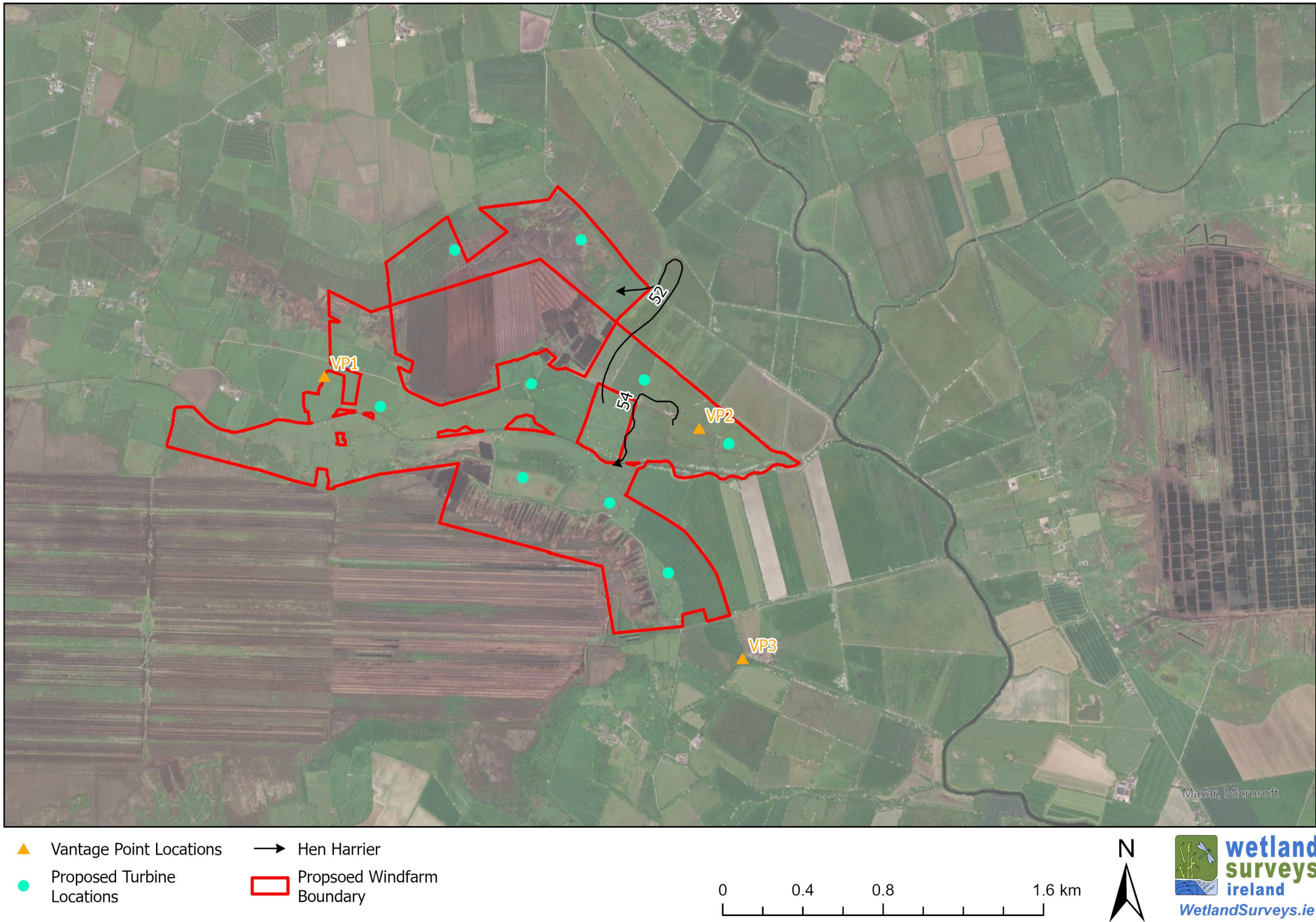


Hen Harrier: Summer 22



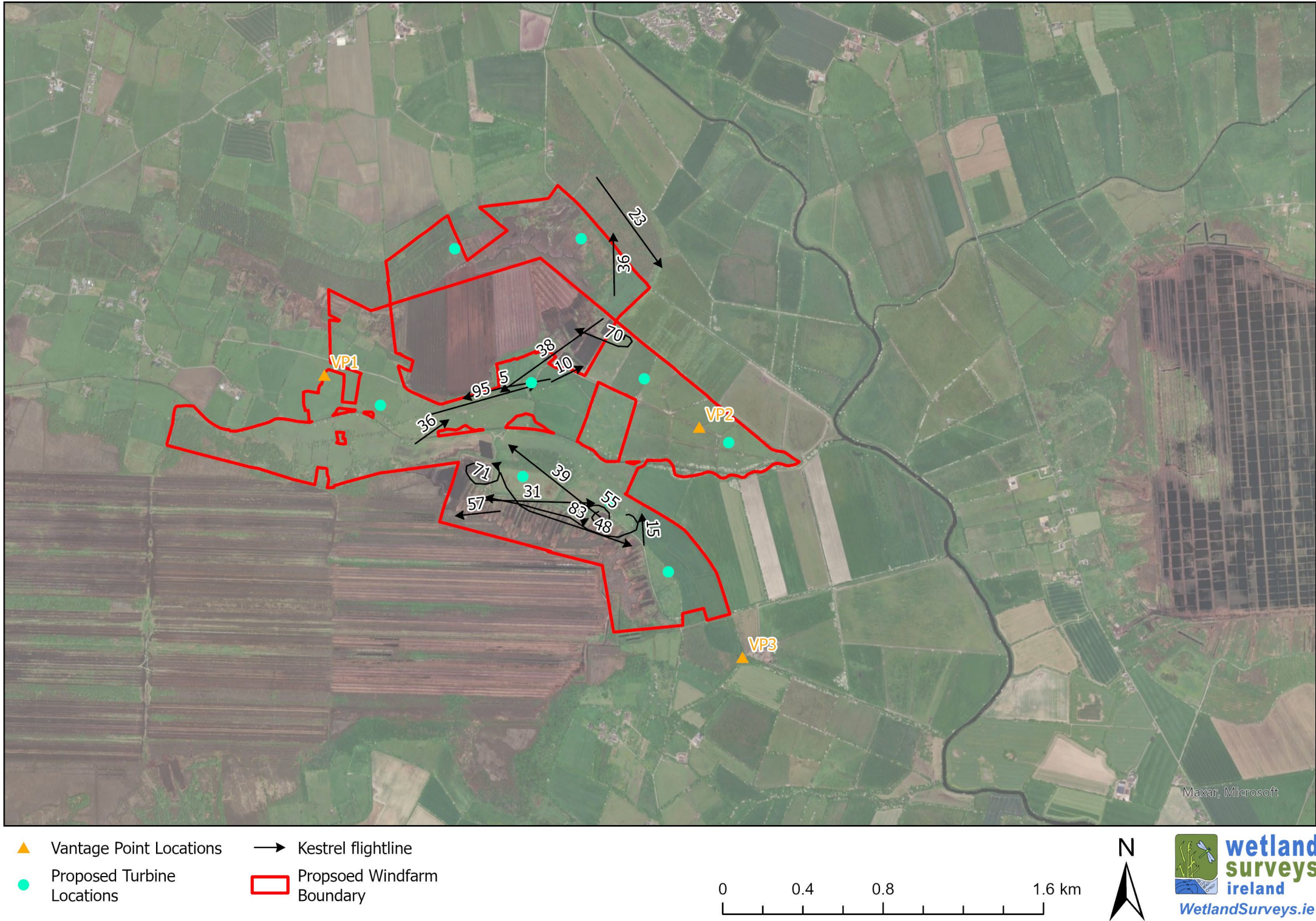


Hen Harrier: Winter 22-23





Kestrel: Winter 2021-22

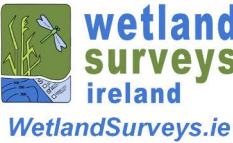
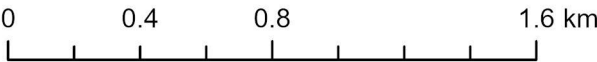




Kestrel: Summer 2022

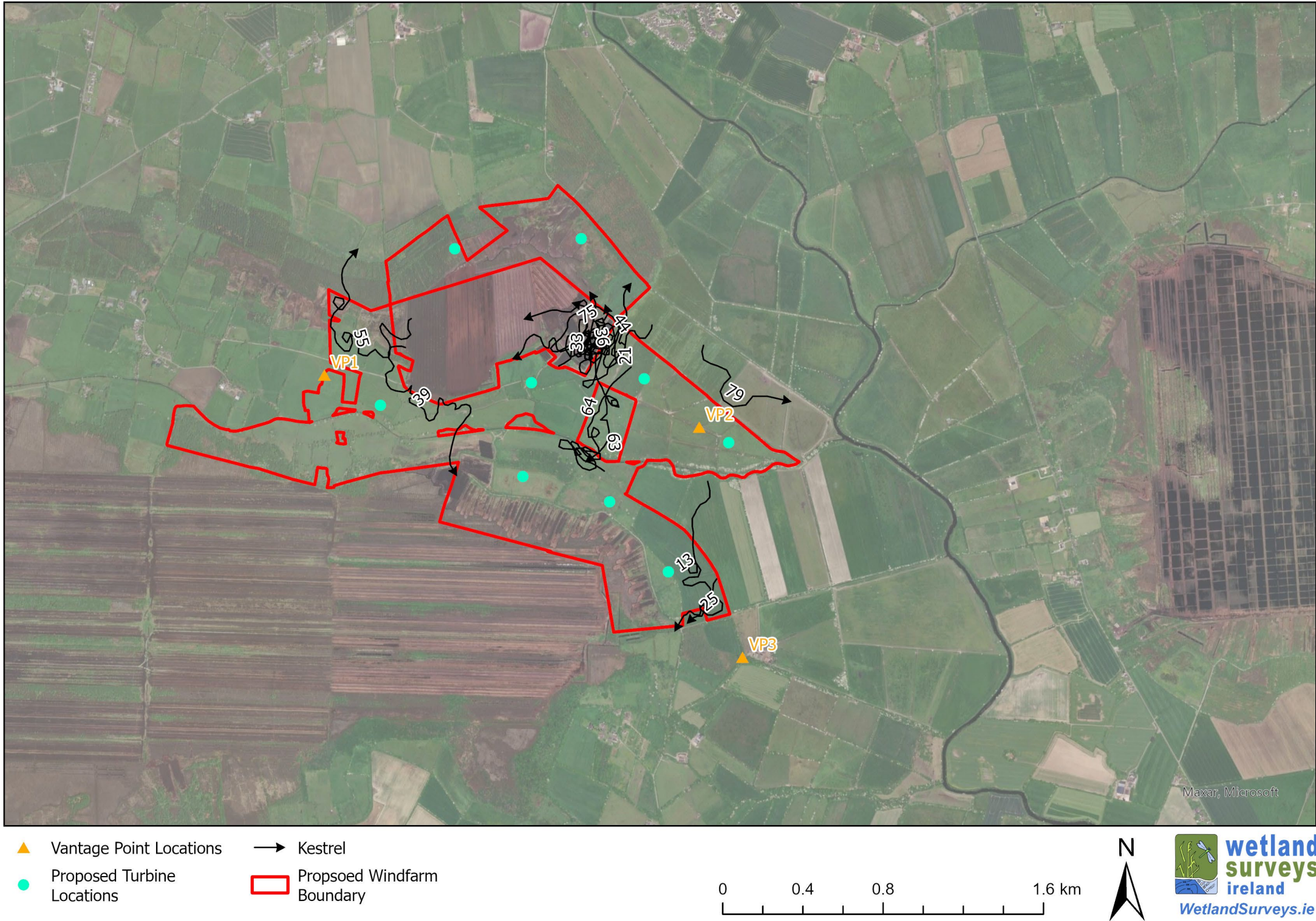


- ▲ Vantage Point Locations
- Proposed Turbine Locations
- Kestrel
- Proposed Windfarm Boundary



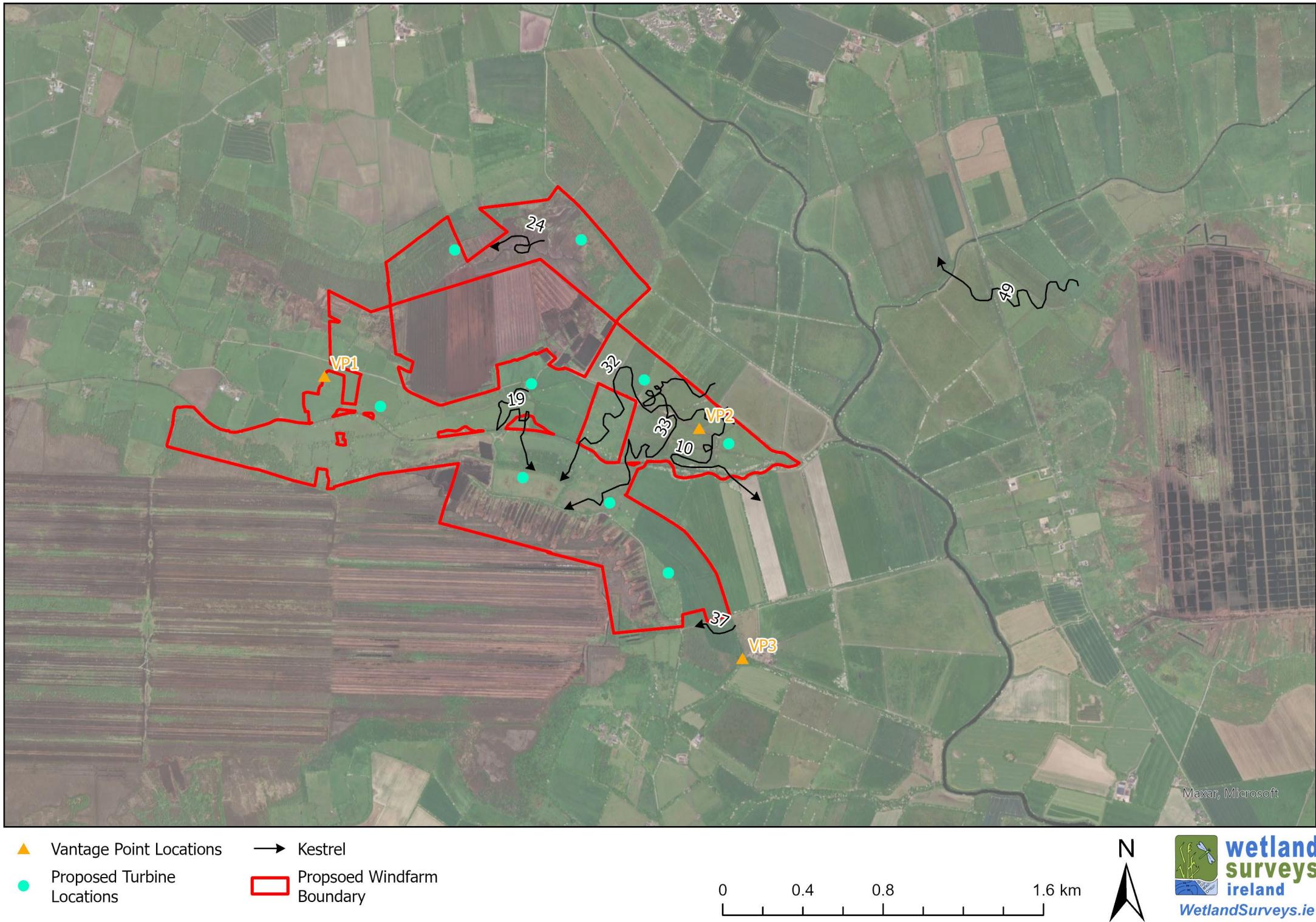


Kestrel: Winter 2022-23



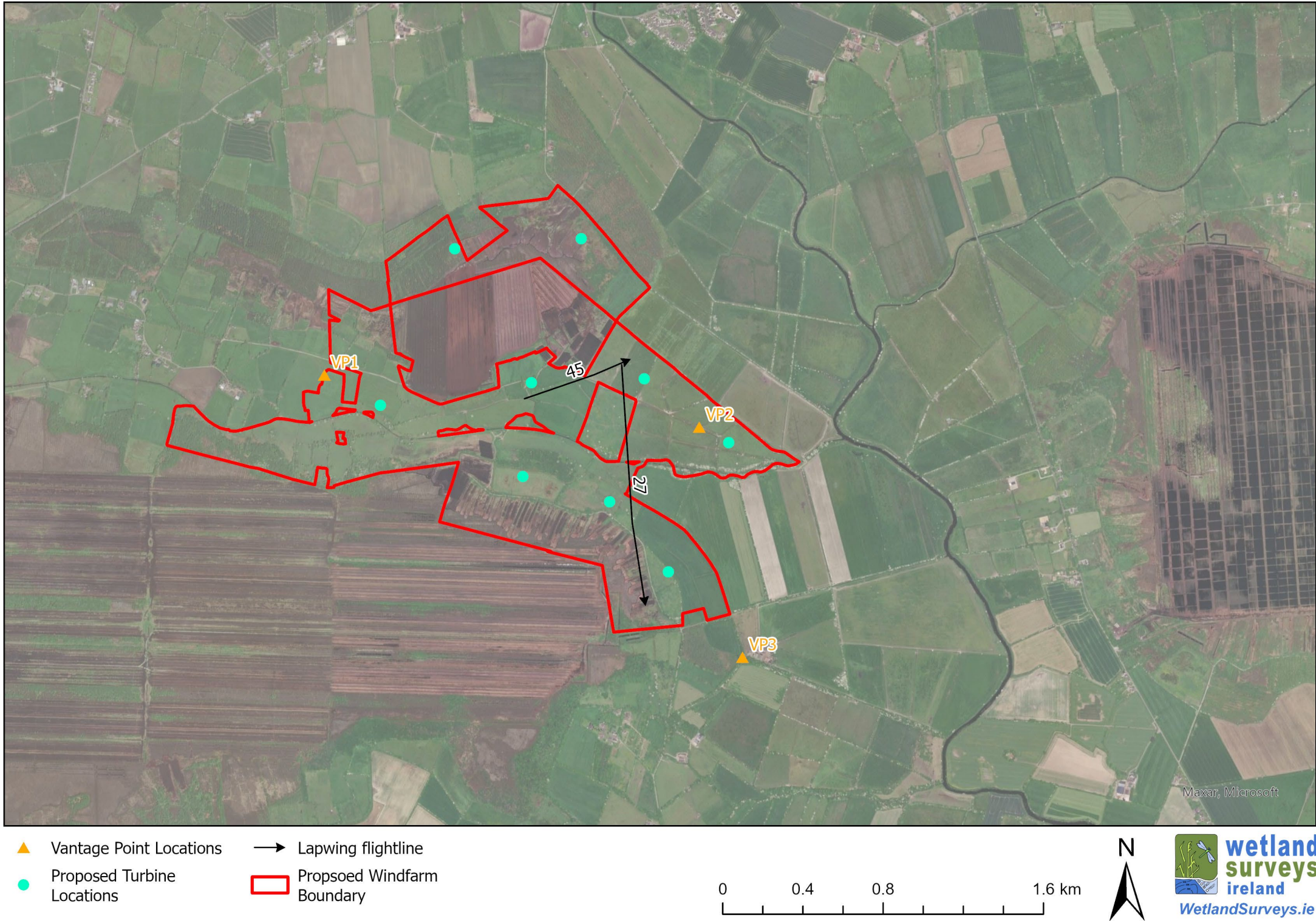


Kestrel: Winter 2023



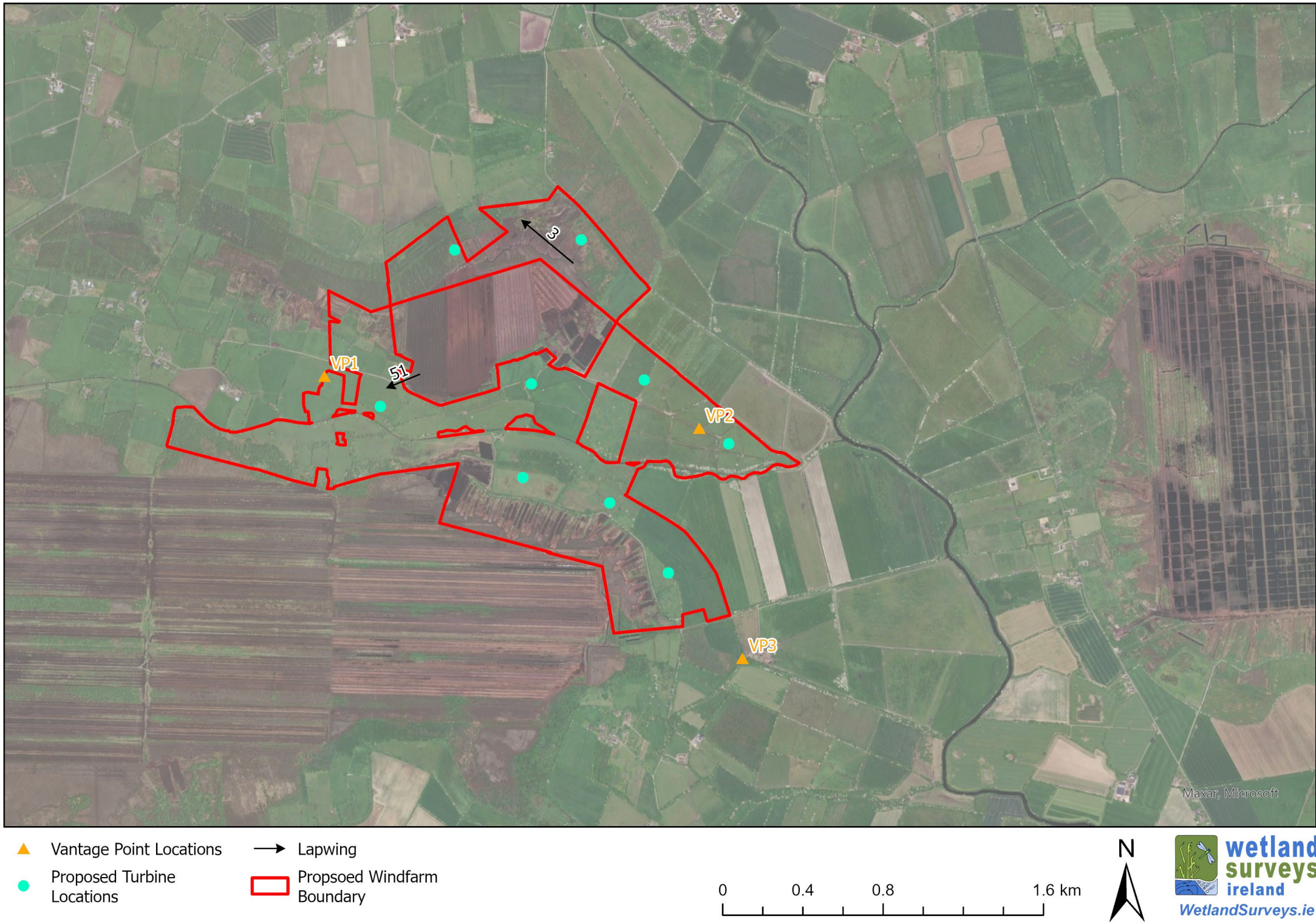


Lapwing: Winter 2021-22



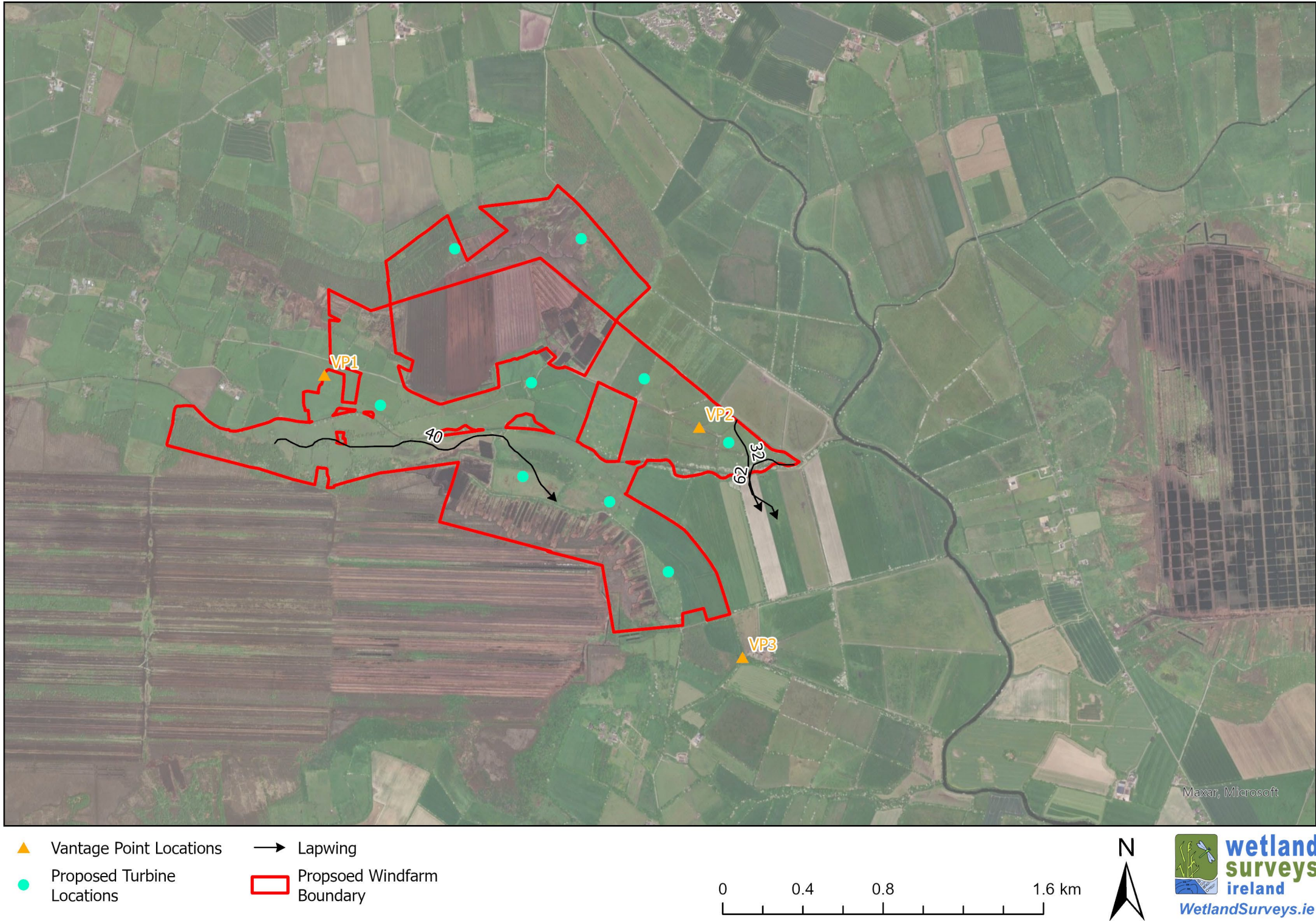


Lapwing: Summer 2022



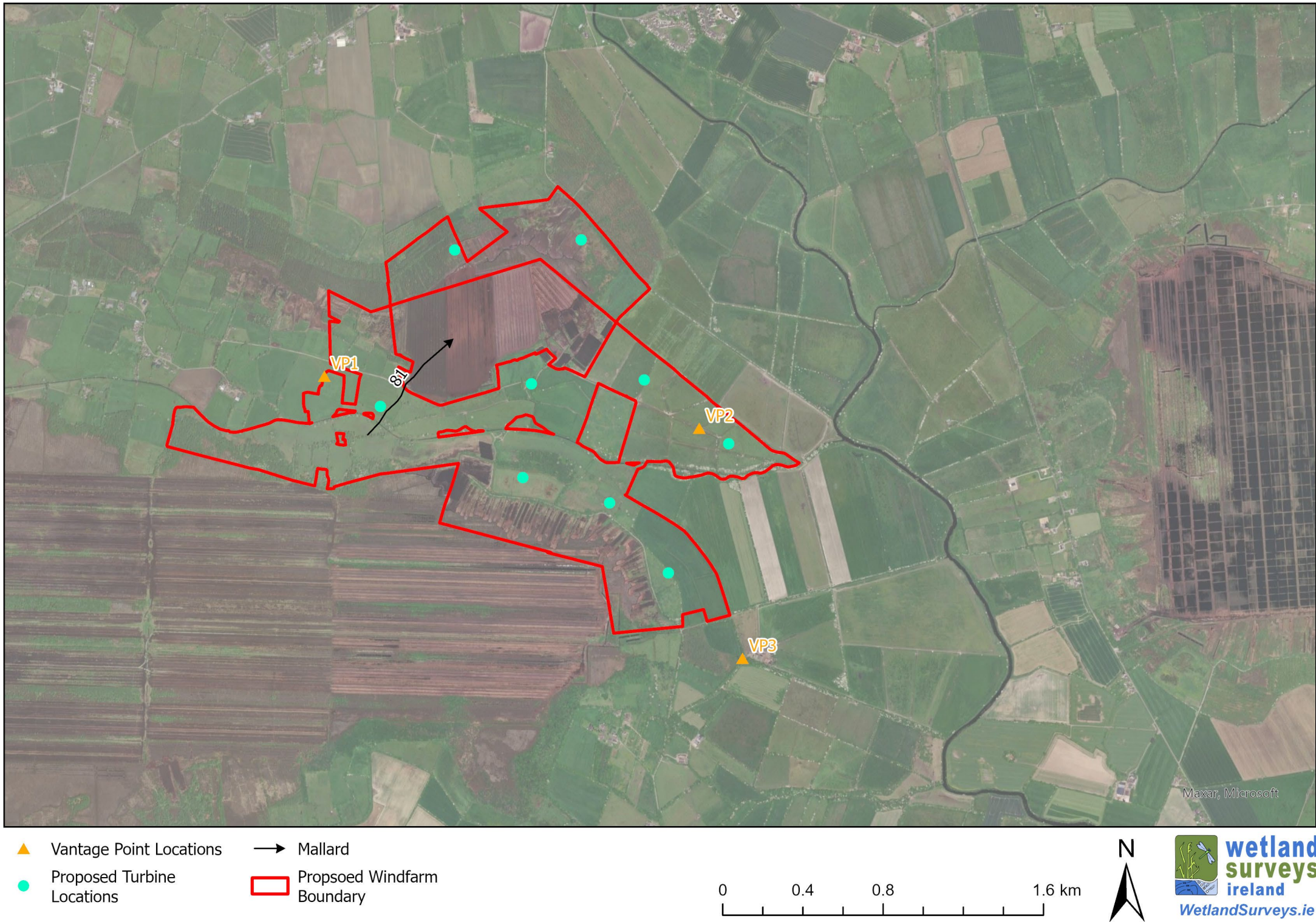


Lapwing: Winter 2022-23





Mallard: Winter 2022-23





Merlin: Winter 2021-22



-  Vantage Point Locations

 Proposed Turbine Locations
-  Merlin flightline

 Proposed Windfarm Boundary

0

0.4

0.8

1.6 km





wetland

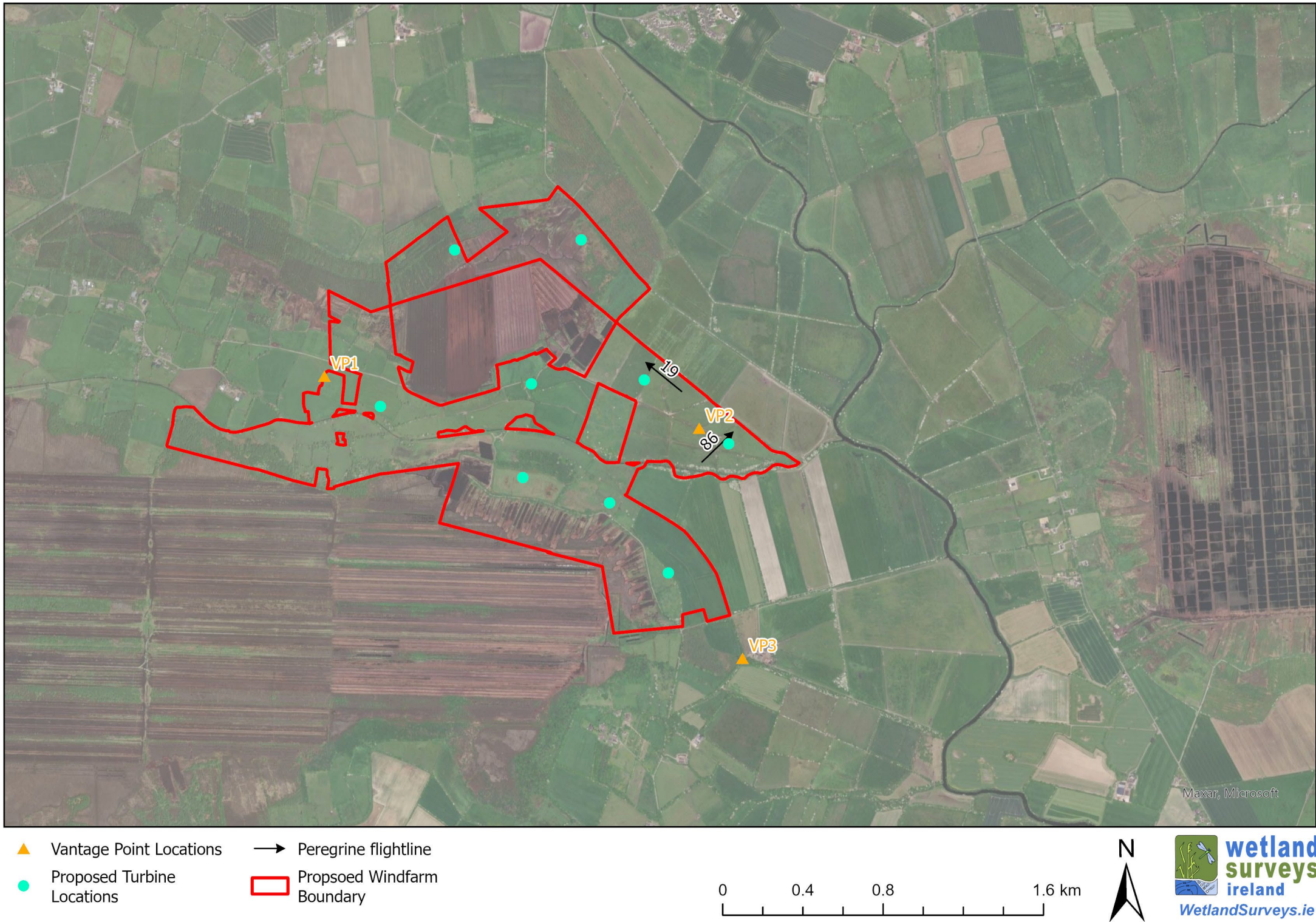
surveys

ireland

WetlandSurveys.ie

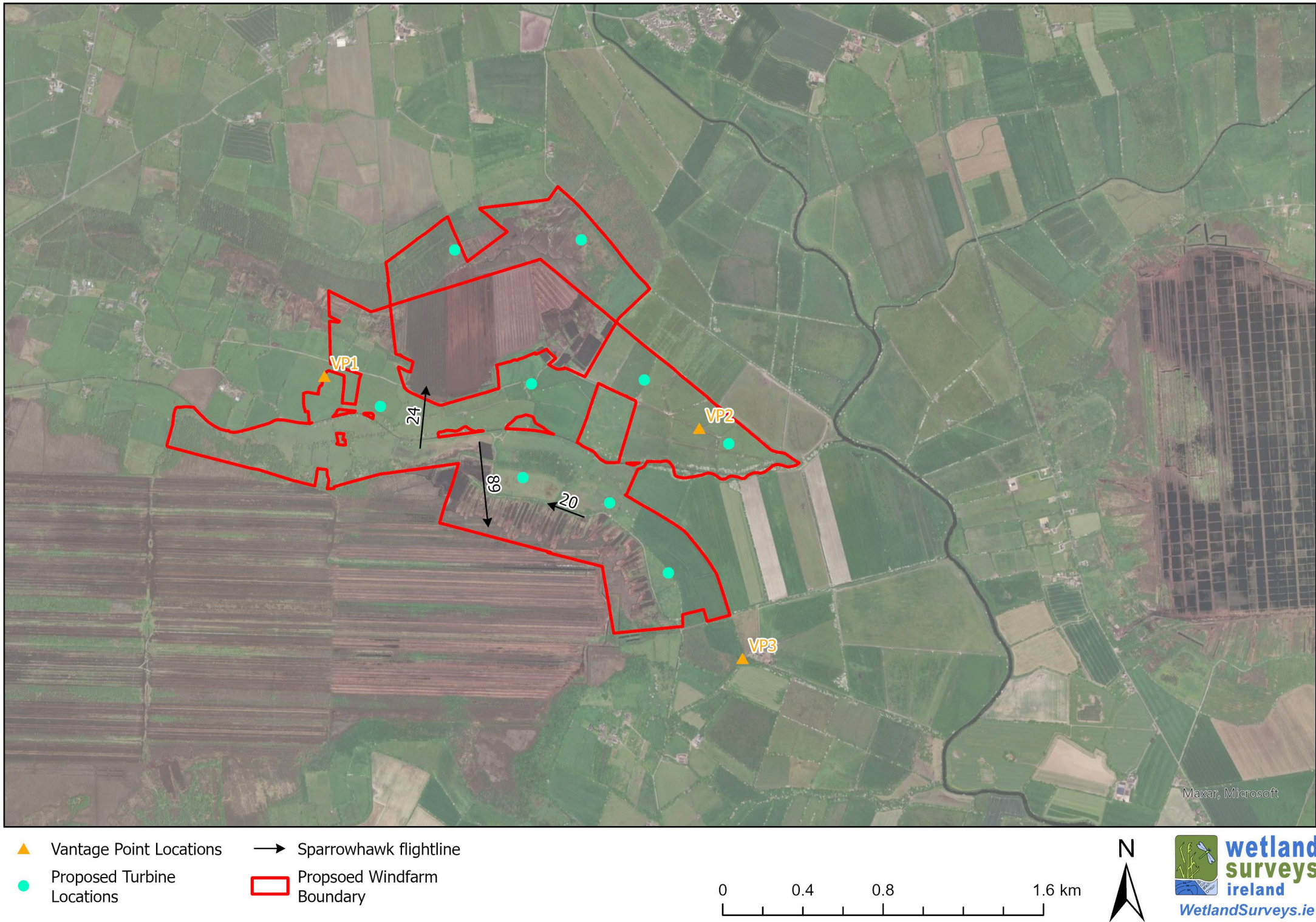


Peregrine: Winter 2021-22



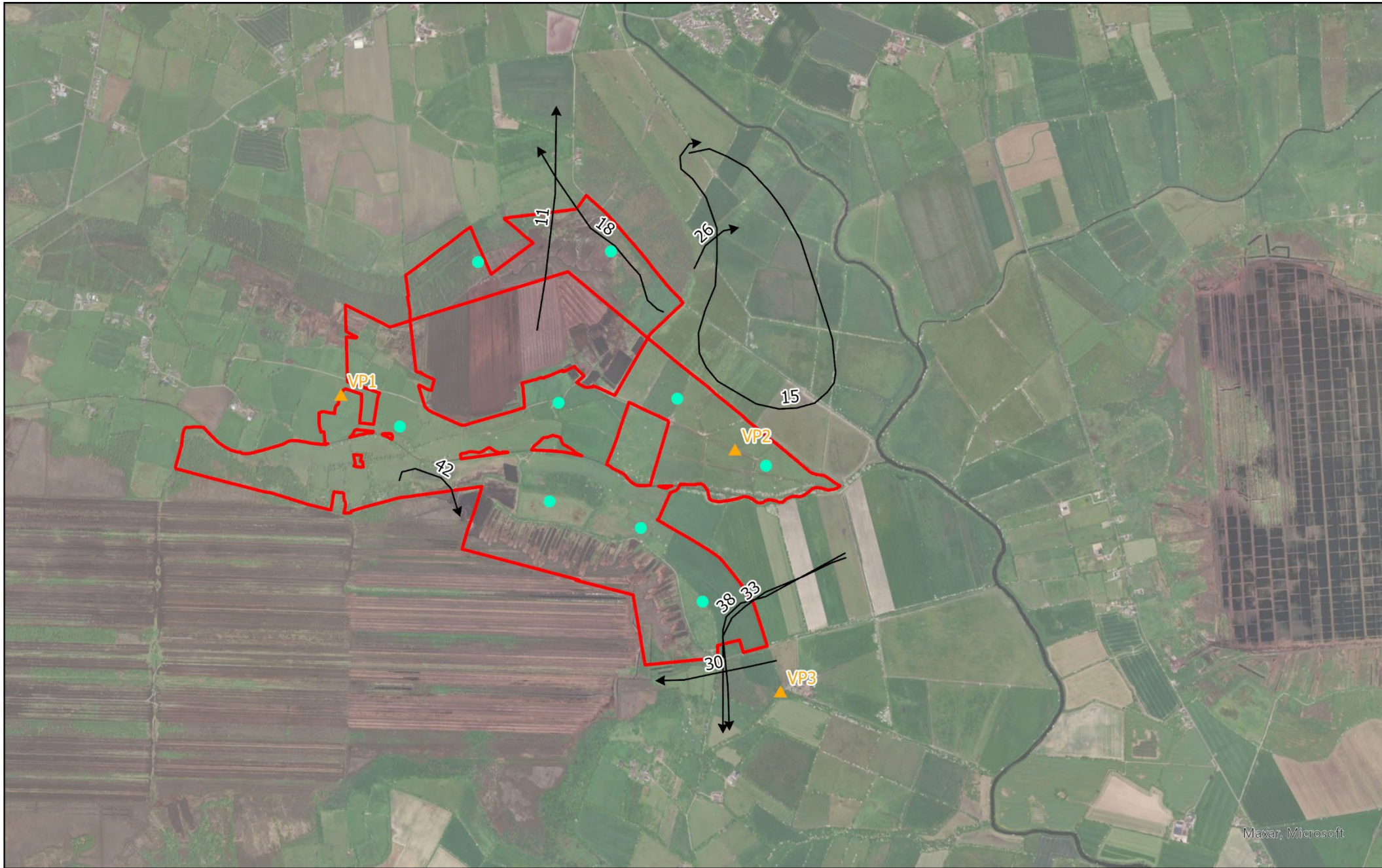


Sparrowhawk: Winter 2021-22

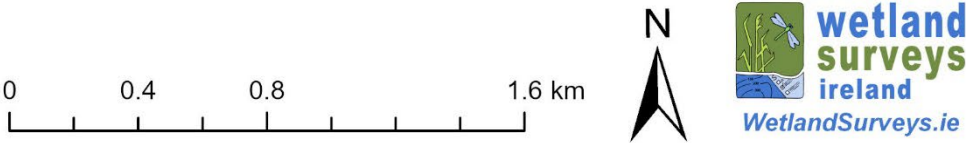




Sparrowhawk: Summer 2022

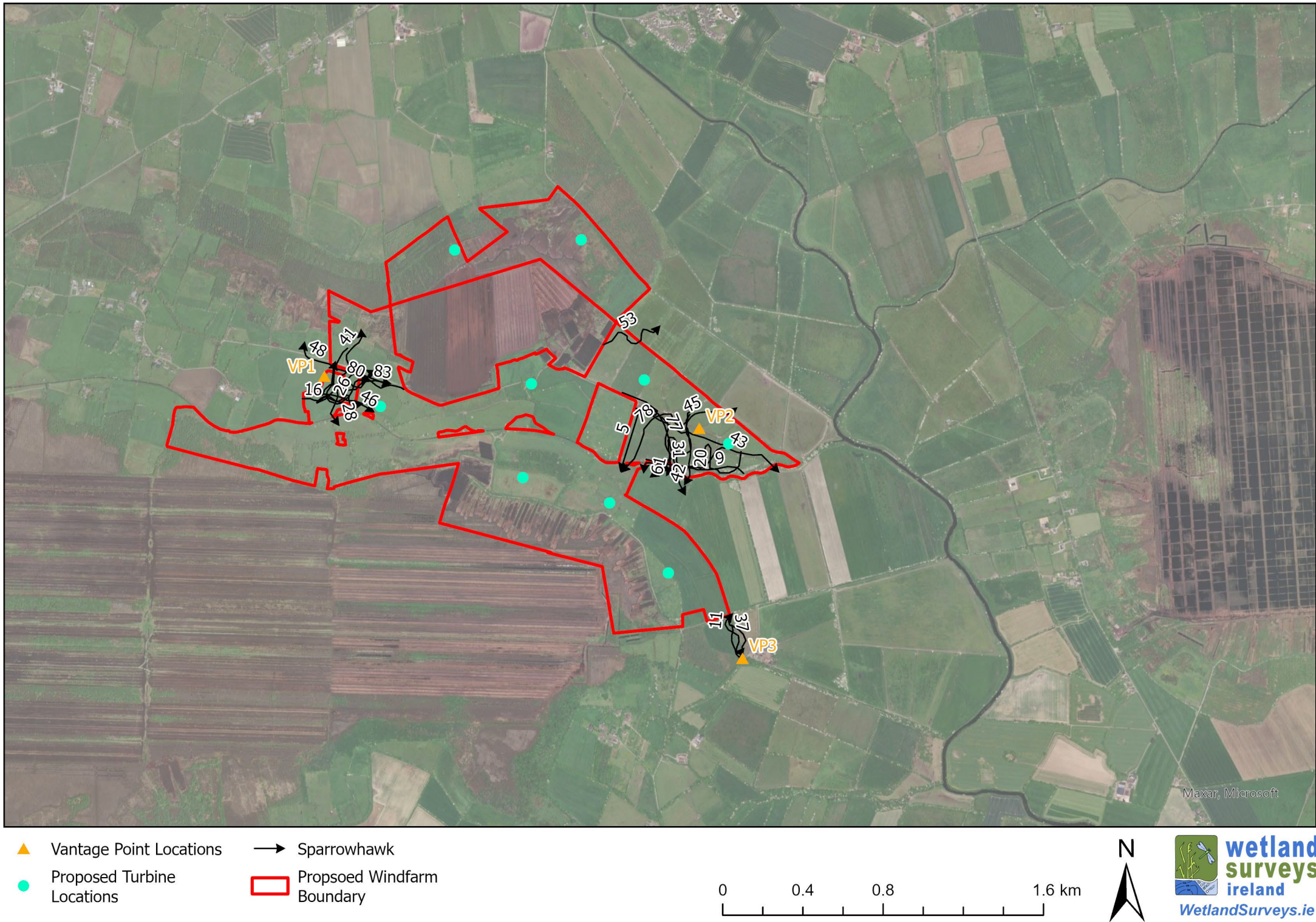


- |                              |                              |
|------------------------------|------------------------------|
| ▲ Vantage Point Locations    | → Sparrowhawk                |
| ● Proposed Turbine Locations | □ Proposed Windfarm Boundary |



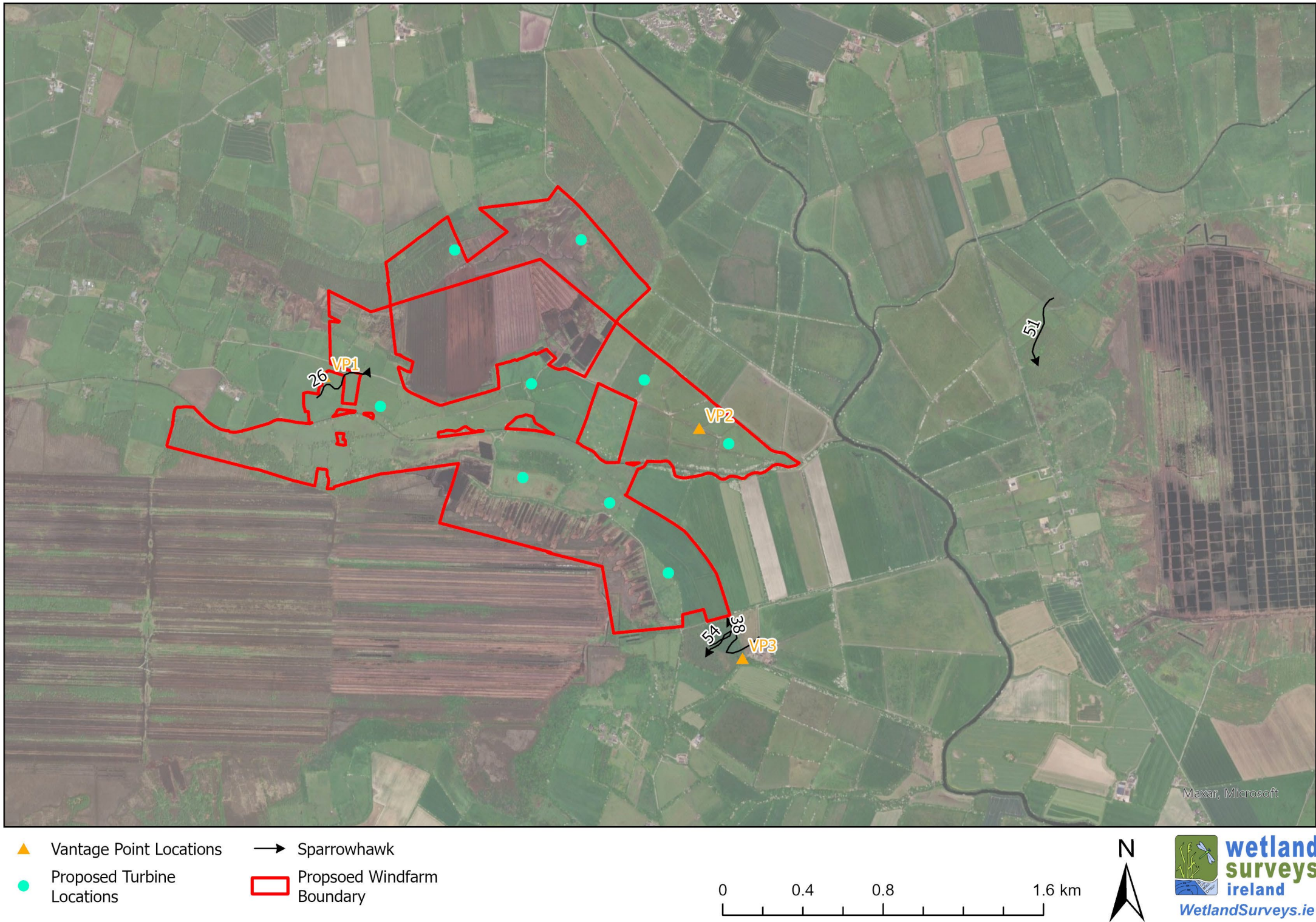


Sparrowhawk: Winter 2022-23



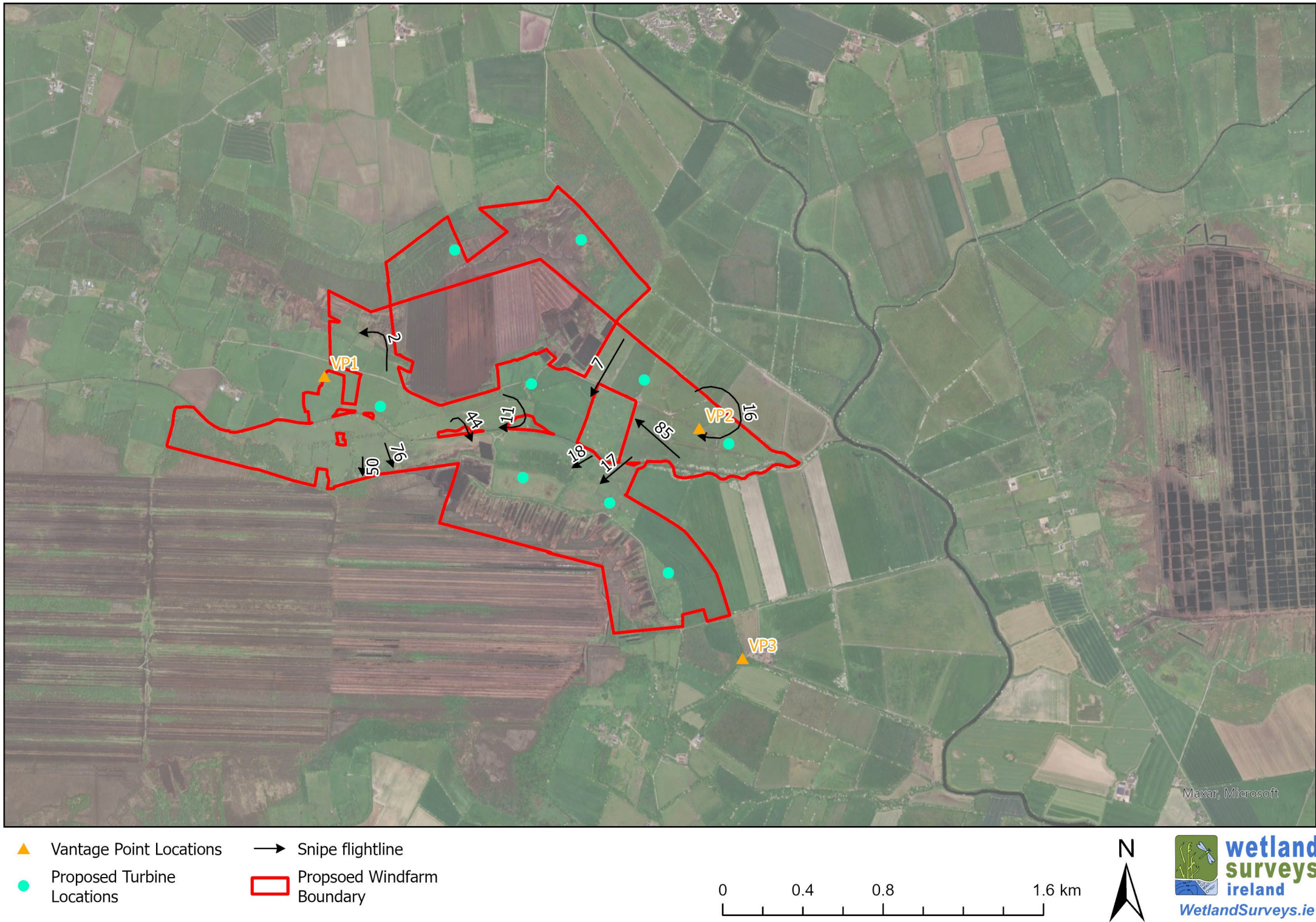


Sparrowhawk: Summer 2023



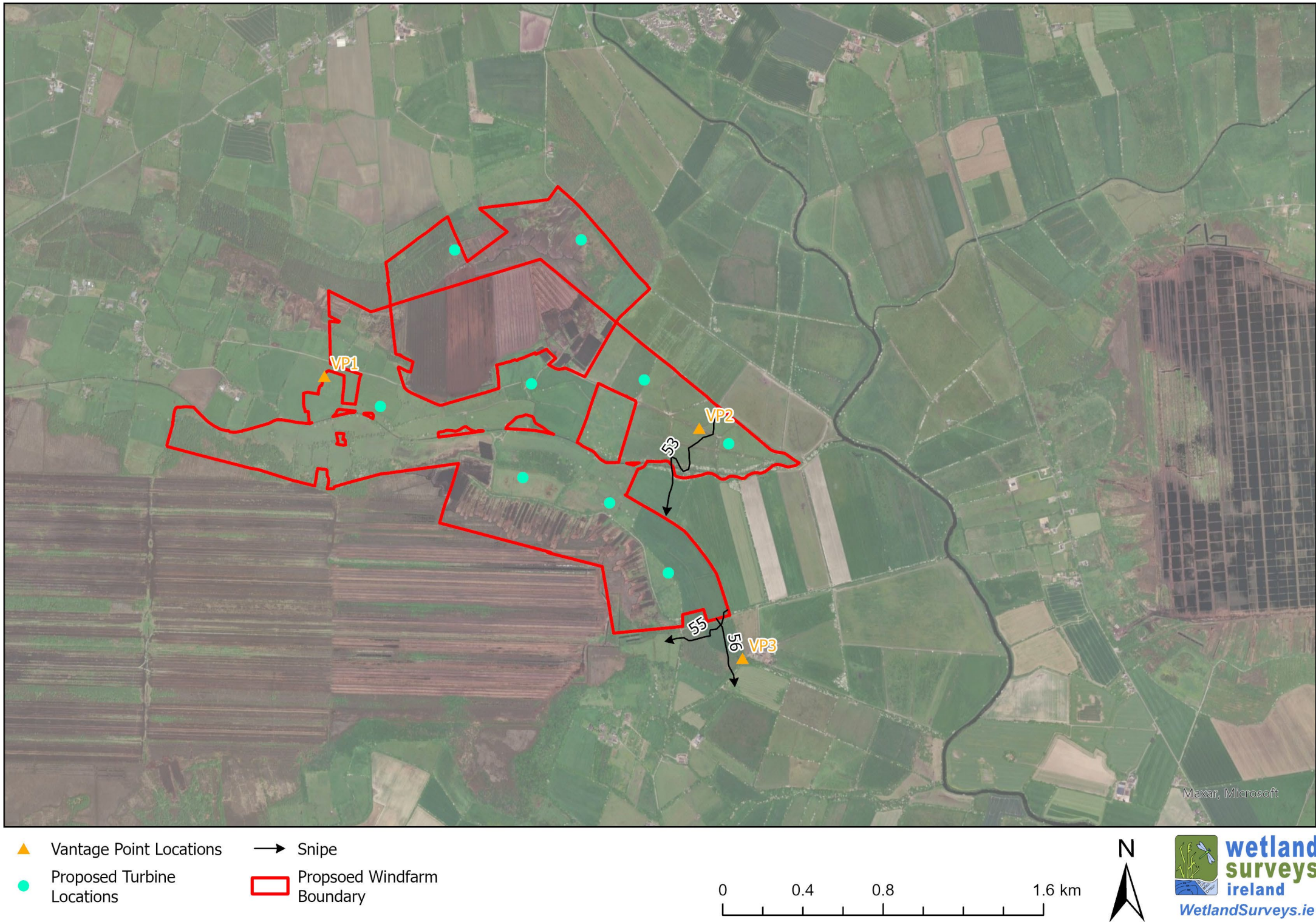


Snipe: Winter 2021-22



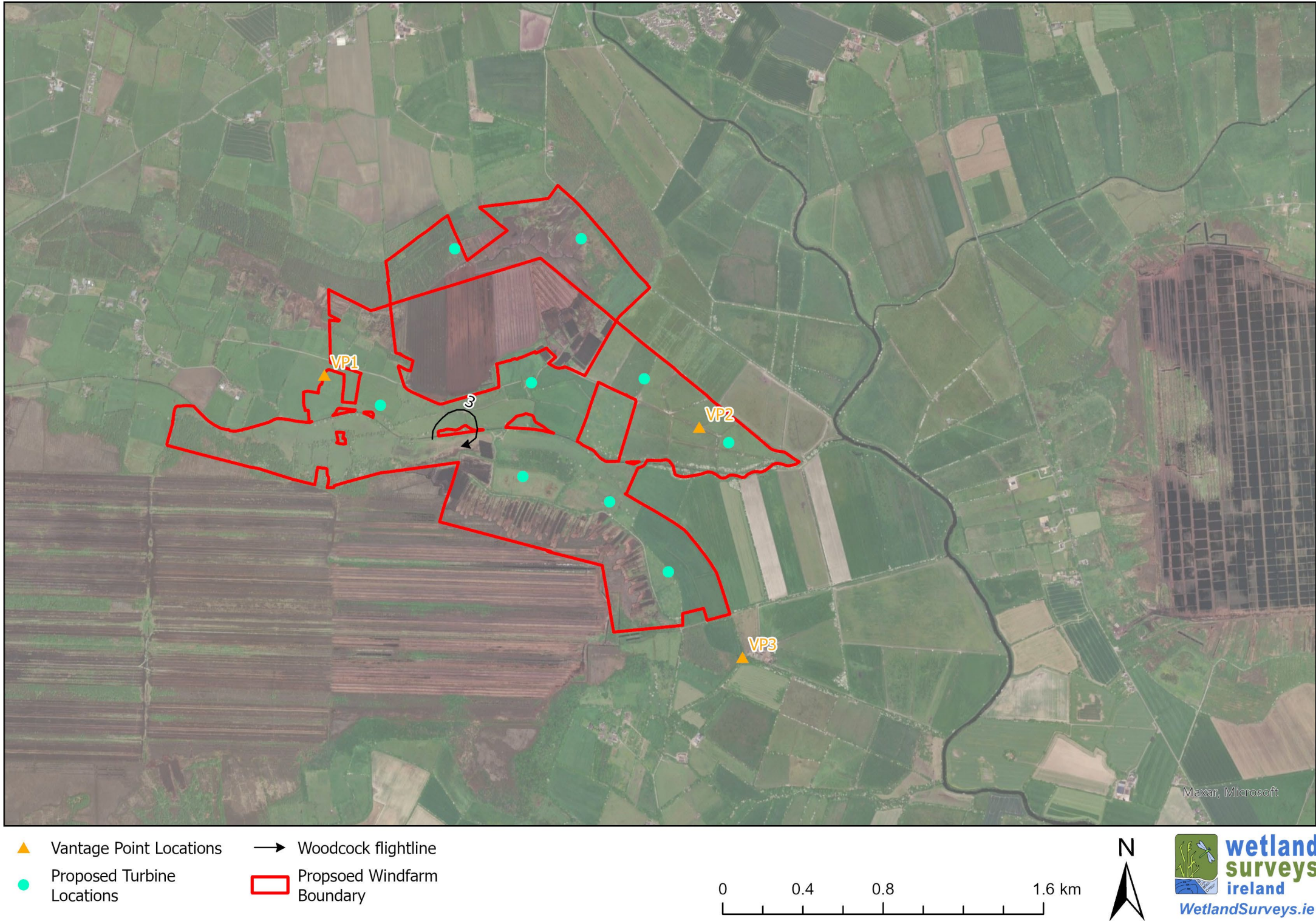


Snipe: Summer 2023





Woodcock: Winter 21-22





## Woodcock: Winter 2022-23



- ▲ Vantage Point Locations
- Proposed Turbine Locations
- Woodcock
- Proposed Windfarm Boundary

0 0.4 0.8 1.6 km





## Whooper Swan: Winter 21-22



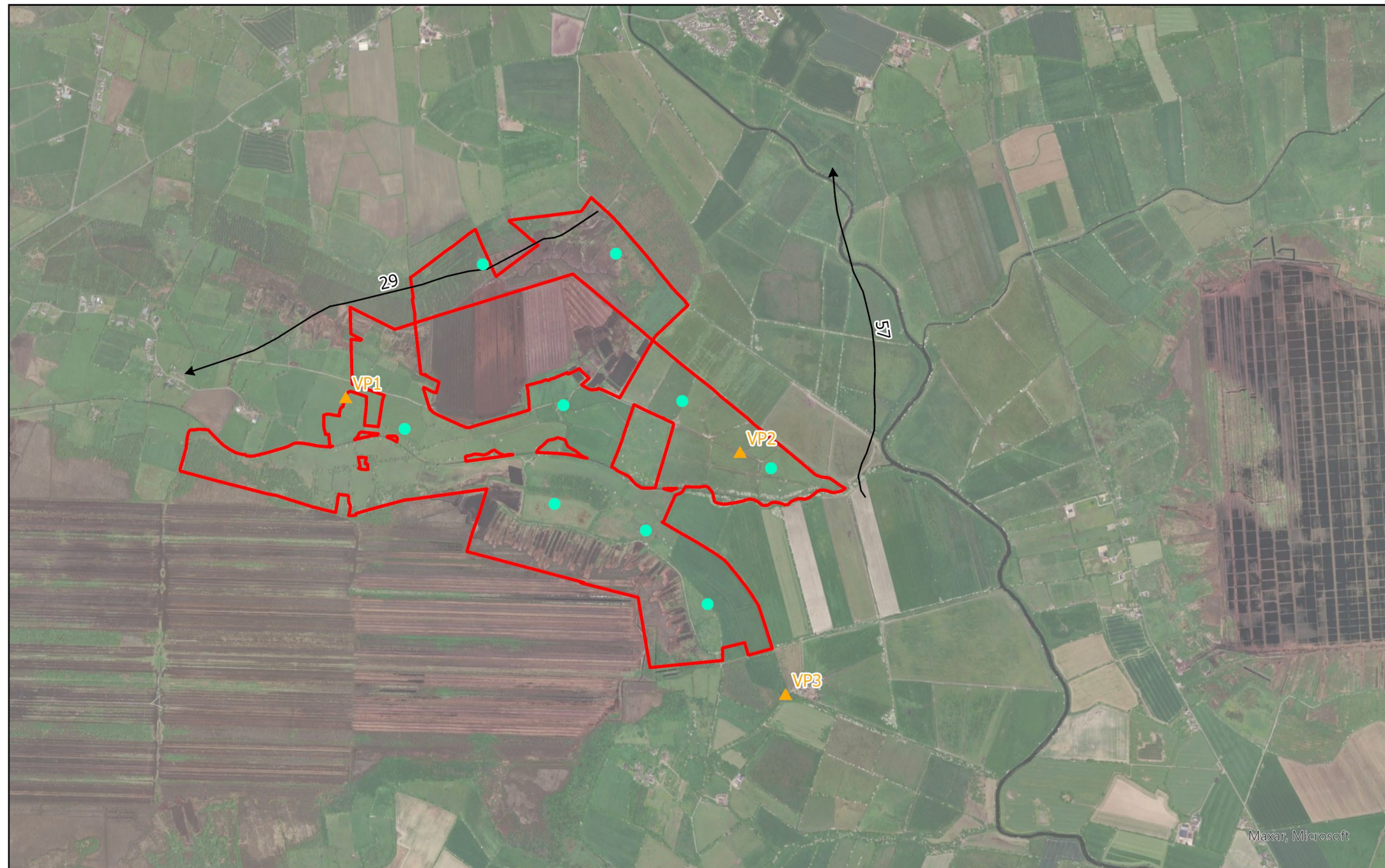
- ▲ Vantage Point Locations
- Proposed Turbine Locations
- Woodcock
- Proposed Windfarm Boundary

0 0.4 0.8 1.6 km





## Whooper Swan: Winter 22-23



- ▲ Vantage Point Locations
- Proposed Turbine Locations
- Whooper Swan
- Proposed Windfarm Boundary

0 0.4 0.8 1.6 km





## APPENDIX 10.4.ii

### Walkover Surveys Data and Maps





## Appendix 4a

### Winter Walkover Survey Data and Maps

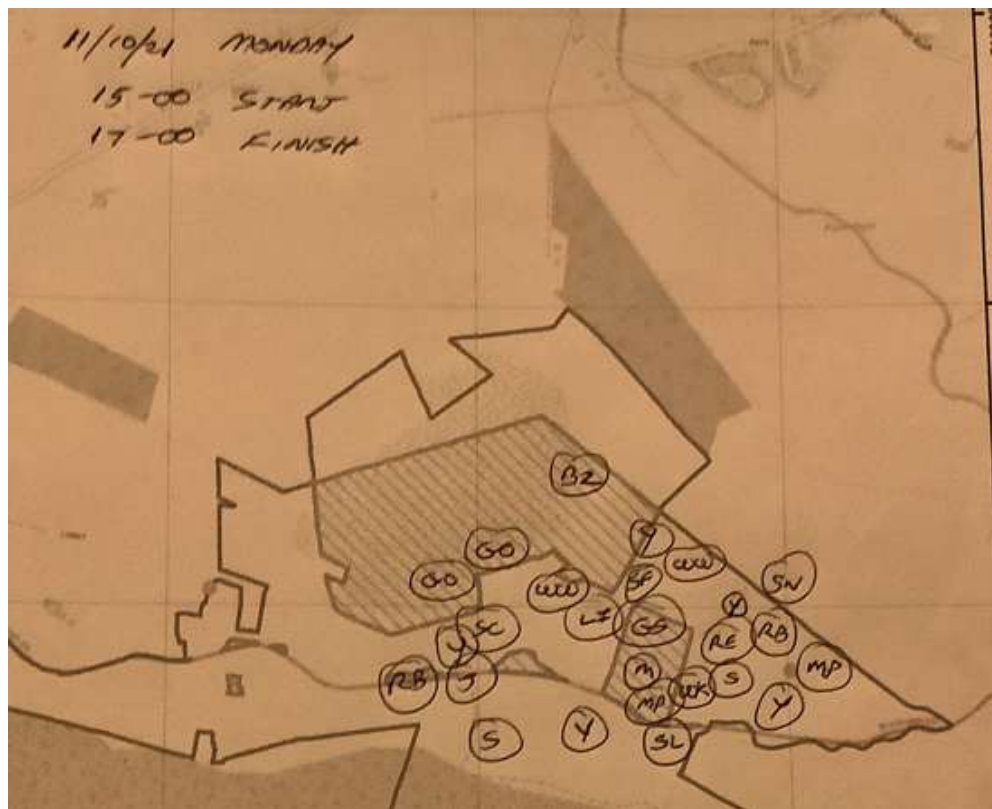
| Survey date | Map Label | Species       | Number | Habitat | Comments             | Age / Sex |
|-------------|-----------|---------------|--------|---------|----------------------|-----------|
| 11/10/2021  | 2         | Buzzard       | 1      |         |                      |           |
| 11/10/2021  | 1         | Linnet        | 18     |         |                      |           |
| 11/10/2021  | 6         | Meadow Pipit  | 4      |         |                      |           |
| 11/10/2021  | 4         | Snipe         | 2      |         |                      |           |
| 11/10/2021  | 5         | Woodcock      | 1      |         |                      |           |
| 11/10/2021  | 3         | Yellowhammer  | 9      |         |                      |           |
| 12/10/2021  | 5         | Buzzard       | 1      |         |                      |           |
| 12/10/2021  | 2         | Kestrel       | 1      |         |                      |           |
| 12/10/2021  | 1         | Meadow Pipit  | 19     |         |                      |           |
| 12/10/2021  | 4         | Skylark       | 1      |         |                      |           |
| 08/11/2021  | 2         | Meadow Pipit  | 15     |         |                      |           |
| 08/11/2021  | 1         | Snipe         | 1      |         |                      |           |
| 09/11/2021  | 1         | Yellowhammer  | 5      |         |                      |           |
| 02/12/2021  | 2         | Linnet        | 12     |         |                      |           |
| 02/12/2021  | 1         | Yellowhammer  | 2      |         |                      |           |
| 03/12/2021  | 1         | Kestrel       | 1      |         |                      |           |
| 03/12/2021  | 2         | Kingfisher    | 1      |         |                      |           |
| 03/12/2021  | 3         | Meadow Pipit  | 17     |         |                      |           |
| 03/01/2022  | 2         | Snipe         | 1      |         |                      |           |
| 03/01/2022  | 1         | Yellowhammer  | 1      |         |                      |           |
| 04/01/2022  | 1         | Yellowhammer  | 1      |         |                      |           |
| 07/03/2022  | 1         | Yellowhammer  | 1      |         |                      |           |
| 08/03/2022  | 3         | Kestrel       | 1      |         |                      |           |
| 08/03/2022  | 2         | Meadow Pipit  | 1      |         |                      |           |
| 08/03/2022  | 1         | Sparrowhawk   | 1      |         |                      |           |
| 31/10/2022  | 6         | Buzzard       | 1      | GA1     | Soaring              | A         |
| 31/10/2022  | 18        | Buzzard       | 1      | PB      | Soaring              | A         |
| 31/10/2022  | 19        | Buzzard       | 1      | GA1     | Travelling           | A         |
| 31/10/2022  | 3         | Golden Plover | 1500   | GA1     | Circling             |           |
| 31/10/2022  | 21        | Golden Plover | 200    | PB      | Circling             |           |
| 31/10/2022  | 9         | Kestrel       | 1      | GA1     | Hunting              | M/A       |
| 31/10/2022  | 20        | Mallard       | 3      | GA1     | Travelling           |           |
| 31/10/2022  | 2         | Meadow Pipit  | 8      | GS      | Foraging/ Flushed    |           |
| 31/10/2022  | 5         | Meadow Pipit  | 3      | GA1     | Foraging             |           |
| 31/10/2022  | 7         | Meadow Pipit  | 5      | GA1     | Foraging/ flushed    |           |
| 31/10/2022  | 10        | Meadow Pipit  | 3      | GA1/WLI | Foaging              |           |
| 31/10/2022  | 13        | Meadow Pipit  | 7      | GS      | Foraging             |           |
| 31/10/2022  | 16        | Meadow Pipit  | 4      | GA1     | Foraging             |           |
| 31/10/2022  | 1         | Redwing       | 11     | WLI     | Foraging             |           |
| 31/10/2022  | 4         | Redwing       | 4      | GA1     | Foraging/ Travelling |           |
| 31/10/2022  | 8         | Redwing       | 2      | GA1     | Travelling           |           |
| 31/10/2022  | 15        | Redwing       | 2      | WLI     | Travelling           |           |
| 31/10/2022  | 17        | Redwing       | 25     | GA1     | Foraging/ Travelling |           |
| 31/10/2022  | 11        | Snipe         | 1      | GA1     | Flushed              |           |

| Survey date | Map Label | Species       | Number | Habitat | Comments          | Age / Sex |
|-------------|-----------|---------------|--------|---------|-------------------|-----------|
| 31/10/2022  | 12        | Snipe         | 5      | PB      | Travelling        |           |
| 31/10/2022  | 14        | Sparrowhawk   | 1      | WLI     | Hunting           | F/A       |
| 13/11/2022  | 6         | Grey Wagtail  | 1      | FW2     | Foraging          | A         |
| 13/11/2022  | 15        | Grey Wagtail  | 1      | GA1     | Foraging          | A         |
| 13/11/2022  | 4         | Kestrel       | 1      | GA1     | Hunting           | M/A       |
| 13/11/2022  | 3         | Meadow Pipit  | 3      | GS      | Foraging          | A         |
| 13/11/2022  | 5         | Meadow Pipit  | 3      | GA1     | Foraging/ Flushed | A         |
| 13/11/2022  | 7         | Meadow Pipit  | 2      | GS      | Foraging          | A         |
| 13/11/2022  | 9         | Meadow Pipit  | 1      | PB4     | Flushed           | A         |
| 13/11/2022  | 13        | Meadow Pipit  | 8      | GA1     | Foraging          | A         |
| 13/11/2022  | 1         | Redwing       | 4      | WLE     | Foraging          | A         |
| 13/11/2022  | 2         | Redwing       | 11     | GA1     | Foraging          | A         |
| 13/11/2022  | 8         | Redwing       | 6      | GA1     | Foraging          | A         |
| 13/11/2022  | 10        | Redwing       | 5      | WS1     | Foraging          | A         |
| 13/11/2022  | 14        | Redwing       | 14     | FGA1    | Foraging          | A         |
| 13/11/2022  | 11        | Sparrowhawk   | 1      | WS1     | Hunting           | F/A       |
| 13/11/2022  | 12        | Sparrowhawk   | 1      | WS1     | Travelling        | F/A       |
| 07/12/2022  | 14        | Golden Plover | 18     | GA1     | Travelling        |           |
| 07/12/2022  | 13        | Kestrel       | 1      | PB      | Hunting           | M/A       |
| 07/12/2022  | 8         | Mallard       | 2      | FW2     | Flushed           |           |
| 07/12/2022  | 3         | Meadow Pipit  | 4      | PB      | Foraging          |           |
| 07/12/2022  | 5         | Meadow Pipit  | 2      | GA1     | Foraging/ Flushed |           |
| 07/12/2022  | 12        | Meadow Pipit  | 5      | GS      | Foraging/ Flushed |           |
| 07/12/2022  | 1         | Redwing       | 7      | WL1     | Foraging          |           |
| 07/12/2022  | 4         | Redwing       | 12     | GA1     | Foraging          |           |
| 07/12/2022  | 7         | Redwing       | 4      | GA1     | Foraging          |           |
| 07/12/2022  | 9         | Redwing       | 5      | GA1     | For               |           |
| 07/12/2022  | 11        | Redwing       | 3      | WS1     | Foraging          |           |
| 07/12/2022  | 15        | Redwing       | 2      | WS1     | Foraging          |           |
| 07/12/2022  | 16        | Redwing       | 2      | GA1     | Foraging          |           |
| 07/12/2022  | 2         | Snipe         | 3      | PB      | Flushed           |           |
| 07/12/2022  | 10        | Snipe         | 1      | PB      | Flushed           |           |
| 07/12/2022  | 18        | Snipe         | 2      | GA1     | Travelling        |           |
| 07/12/2022  | 17        | Sparrowhawk   | 1      | GA1     | Hunting           | F/A       |
| 07/12/2022  | 6         | Yellowhammer  | 1      | WL1     | Perched           | M/A       |
| 12/01/2023  | 11        | Buzzard       | 1      | GA1     | Travelling        |           |
| 12/01/2023  | 3         | Meadow Pipit  | 4      | GA1     | Foraging          |           |
| 12/01/2023  | 1         | Redwing       | 8      | GA1     | Foraging          |           |
| 12/01/2023  | 5         | Redwing       | 5      | WL1     | Foraging          |           |
| 12/01/2023  | 6         | Redwing       | 2      | WL1     | Foraging          |           |
| 12/01/2023  | 9         | Redwing       | 4      | WS1     | Travelling        |           |
| 12/01/2023  | 10        | Redwing       | 7      | WS1     | Foraging          |           |
| 12/01/2023  | 12        | Redwing       | 11     | GA1     | Foraging          |           |
| 12/01/2023  | 2         | Snipe         | 3      | PB      | Flushed           |           |
| 12/01/2023  | 4         | Snipe         | 1      | GA1     | Flushed           |           |
| 12/01/2023  | 7         | Snipe         | 1      | GA1     | Flushed           |           |
| 12/01/2023  | 8         | Yellowhammer  | 3      | WL1     | Foraging          |           |
| 12/01/2023  | 13        | Yellowhammer  | 2      | WL1     | Perched           |           |

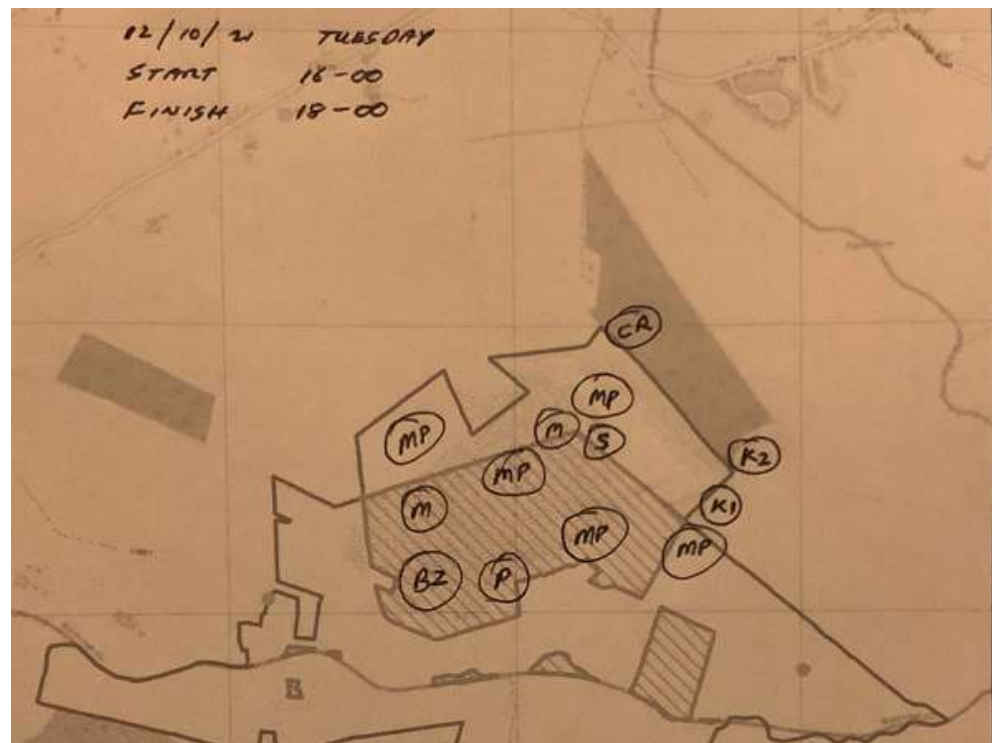


| Survey date | Map Label | Species       | Number | Habitat | Comments            | Age / Sex |
|-------------|-----------|---------------|--------|---------|---------------------|-----------|
| 02/02/2023  | 11        | Buzzard       | 1      | WL2     | Perched             |           |
| 02/02/2023  | 14        | Golden Plover | 30     | GA1     | Travelling          |           |
| 02/02/2023  | 9         | Grey Heron    | 1      | FW2     | Flushed             |           |
| 02/02/2023  | 4         | Meadow Pipit  | 4      | GS      | Foraging            |           |
| 02/02/2023  | 5         | Meadow Pipit  | 2      | GS      | Flushed             |           |
| 02/02/2023  | 7         | Meadow Pipit  | 2      | GA1     | Foraging            |           |
| 02/02/2023  | 1         | Redwing       | 12     | GA1     | Foraging            |           |
| 02/02/2023  | 6         | Redwing       | 7      | GA1     | Foraging            |           |
| 02/02/2023  | 8         | Redwing       | 17     | GA1     | Foraging            |           |
| 02/02/2023  | 13        | Redwing       | 8      | GA1     | Foraging            |           |
| 02/02/2023  | 15        | Redwing       | 4      | GA1     | Foraging            |           |
| 02/02/2023  | 16        | Redwing       | 15     | GA1     | Foraging            |           |
| 02/02/2023  | 3         | Snipe         | 3      | PB      | Flushed             |           |
| 02/02/2023  | 10        | Sparrowhawk   | 1      | WL1     | Hunting             |           |
| 02/02/2023  | 2         | Yellowhammer  | 1      | WL1     | Perched             |           |
| 02/02/2023  | 12        | Yellowhammer  | 3      | WL1     | Foraging            |           |
| 02/03/2023  | 19        | Buzzard       | 1      | GA1     | Hunting             |           |
| 02/03/2023  | 21        | Buzzard       | 1      | WL2     | Perched             |           |
| 02/03/2023  | 16        | Grey Heron    | 1      | GA1     | Foraging            |           |
| 02/03/2023  | 7         | Kestrel       | 1      | GA1     | Hunting             |           |
| 02/03/2023  | 14        | Mallard       | 2      | FW2     | Flushed             |           |
| 02/03/2023  | 15        | Mallard       | 3      | FS      | Flushed             |           |
| 02/03/2023  | 1         | Meadow Pipit  | 3      | GA1     | Foraging            |           |
| 02/03/2023  | 4         | Meadow Pipit  | 4      | PB      | Foraging/Displaying |           |
| 02/03/2023  | 6         | Meadow Pipit  | 2      | GA1     | Displaying          |           |
| 02/03/2023  | 8         | Meadow Pipit  | 2      | GA1     | Displaying          |           |
| 02/03/2023  | 10        | Meadow Pipit  | 4      | GA1     | Foraging            |           |
| 02/03/2023  | 12        | Meadow Pipit  | 2      | GS      | Foraging            |           |
| 02/03/2023  | 17        | Meadow Pipit  | 5      | GA1     | Foraging/Displaying |           |
| 02/03/2023  | 20        | Meadow Pipit  | 4      | GA1     | Foraging            |           |
| 02/03/2023  | 5         | Redwing       | 9      | GA1     | Travelling          |           |
| 02/03/2023  | 11        | Redwing       | 5      | WS1     | Foraging            |           |
| 02/03/2023  | 13        | Redwing       | 4      | WL1     | Foraging            |           |
| 02/03/2023  | 18        | Redwing       | 11     | GA1     | Travelling          |           |
| 02/03/2023  | 2         | Snipe         | 1      | PB      | Flushed             |           |
| 02/03/2023  | 3         | Snipe         | 2      | PB      | Flushed             |           |
| 02/03/2023  | 9         | Yellowhammer  | 3      | WL1     | Perched             |           |

Winter walkover: 11/10/21



Winter walkover: 12/10/21

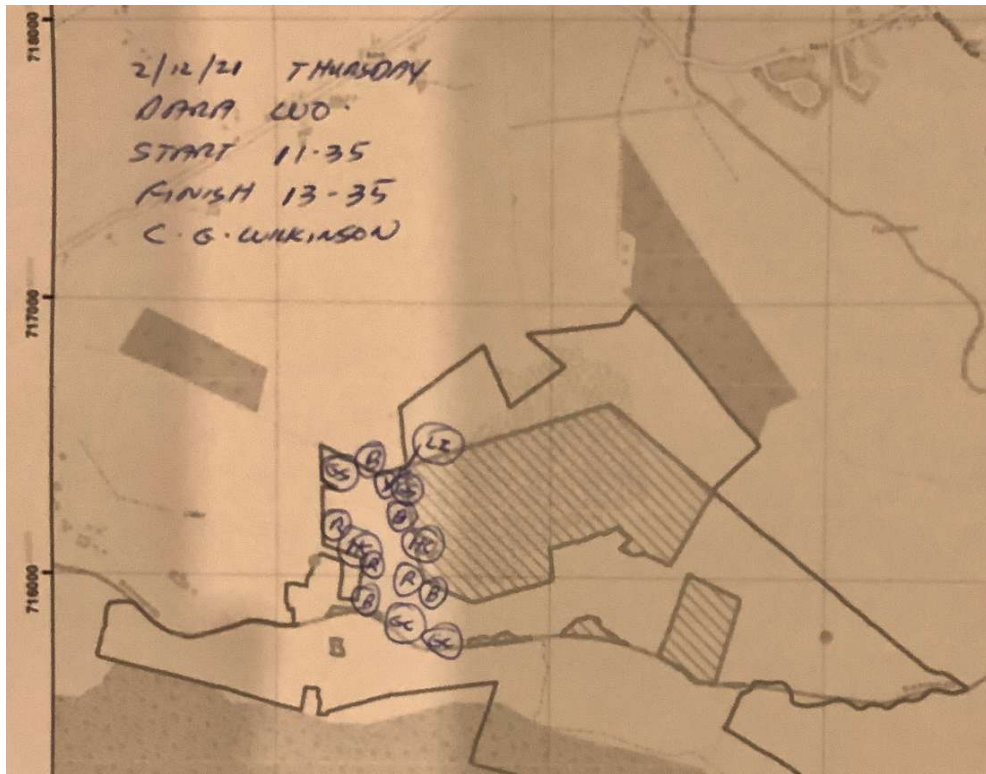




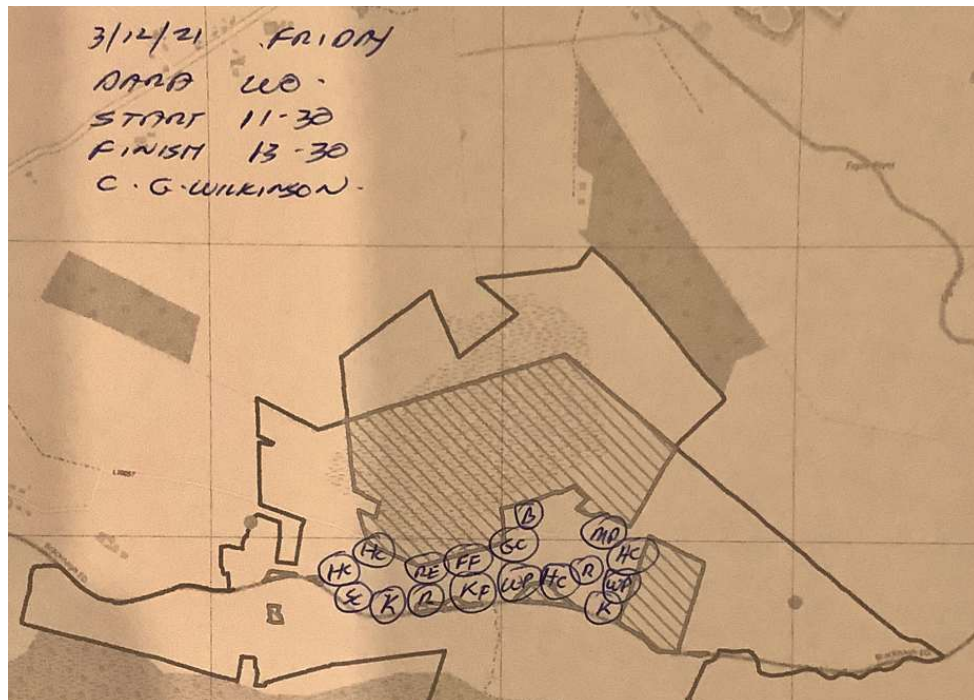
A hand-drawn map of the study area, showing a coastline and a large hatched area representing a forest. A cluster of sampling points is marked with circles containing codes: MP, RE, FF, M, RE, WP, CH, BZ, GT, GC, RE, SN, RE, ST, CH, RB, RE, BZ, and FF. A scale bar indicates 0 to 1000 meters.

9/11/21 TUESDAY  
DARA  
WALKOVER  
START 10-30  
Finish 12-30  
C.G. WILKINSON

Winter walkover: 02/12/21

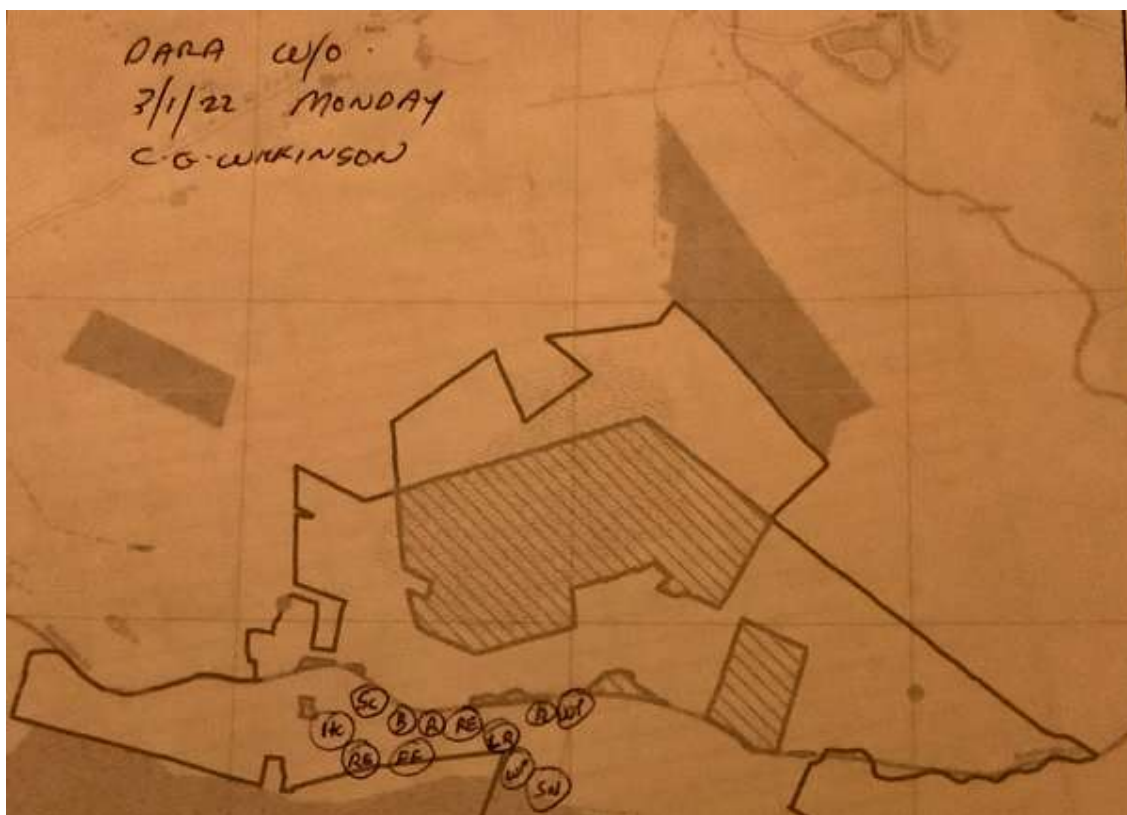


Winter walkover: 3/12/21

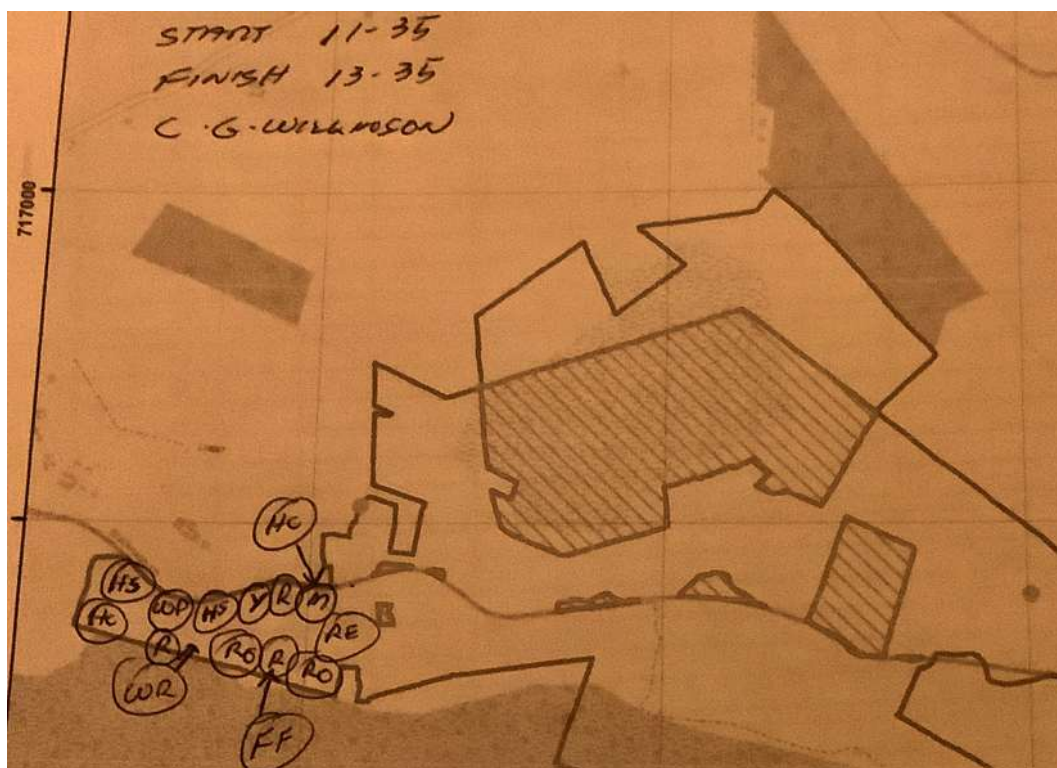




Winter walkover: 3/1/22



Winter walkover: 4/1/22



Winter walkover: 21/2/22

[illegible]

## Winter walkover: 22/2/22

DATA W/O.  
22/2/22 TUESDAY  
START 11-30  
FINISH 13-30  
C.G. WILKINSON

A hand-drawn sketch map on a grid background, showing a building complex. The complex consists of several interconnected rectangular and irregular shapes. One large central area is filled with diagonal hatching. Arrows indicate movement paths: one path enters from the left, moves right, and then splits into two paths that lead into the hatched area; another path enters from the bottom left, moves right, and then splits into two paths that lead into the hatched area; a third path enters from the bottom right, moves left, and then splits into two paths that lead into the hatched area. The map is labeled with 'DATA W/O.' at the top left, '22/2/22 TUESDAY' below it, 'START 11-30' below that, 'FINISH 13-30' below that, and 'C.G. WILKINSON' at the bottom left. The map is also labeled with 'DATA' on the left edge and 'DATA' on the right edge.



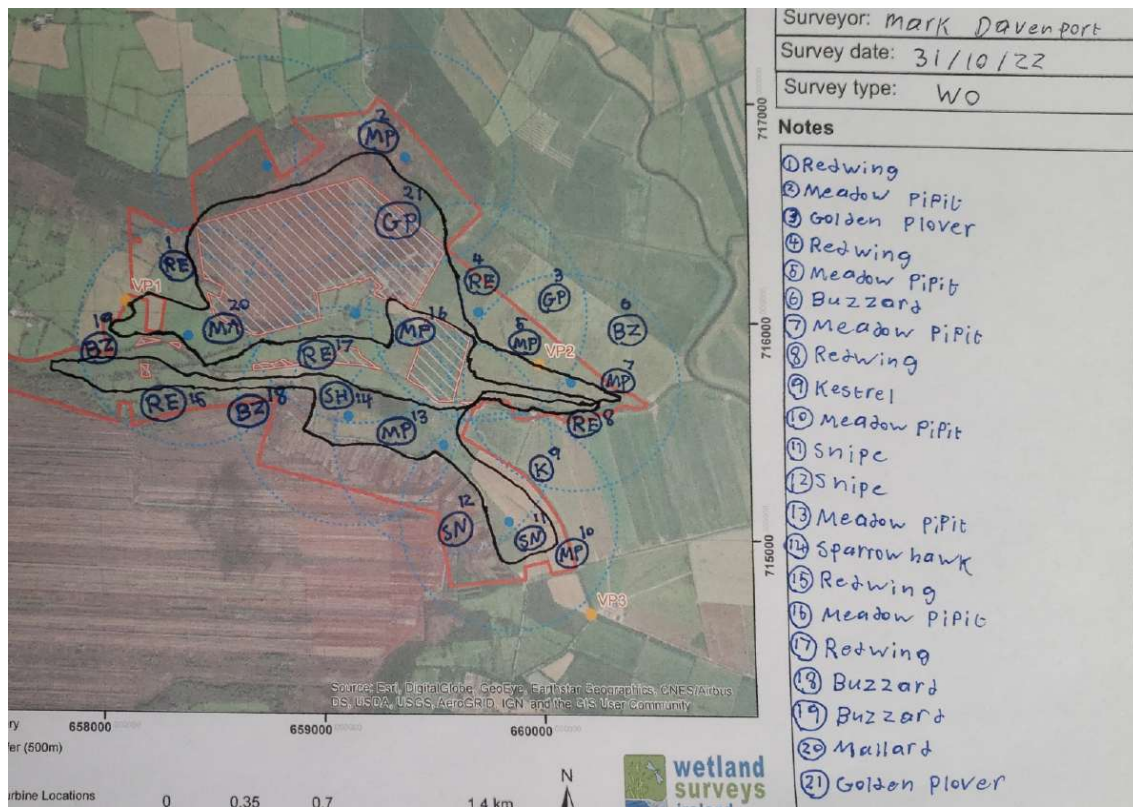
Winter walkover: 7/3/22



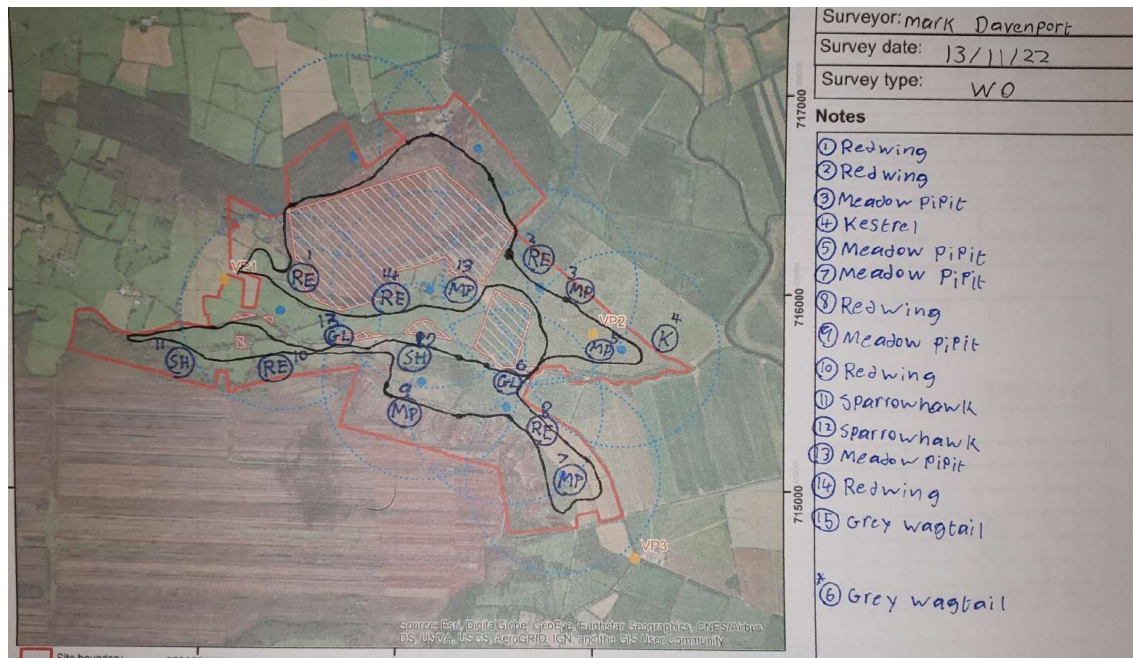
Winter walkover: 8/3/22



## Winter Walkover - 31/10/2022

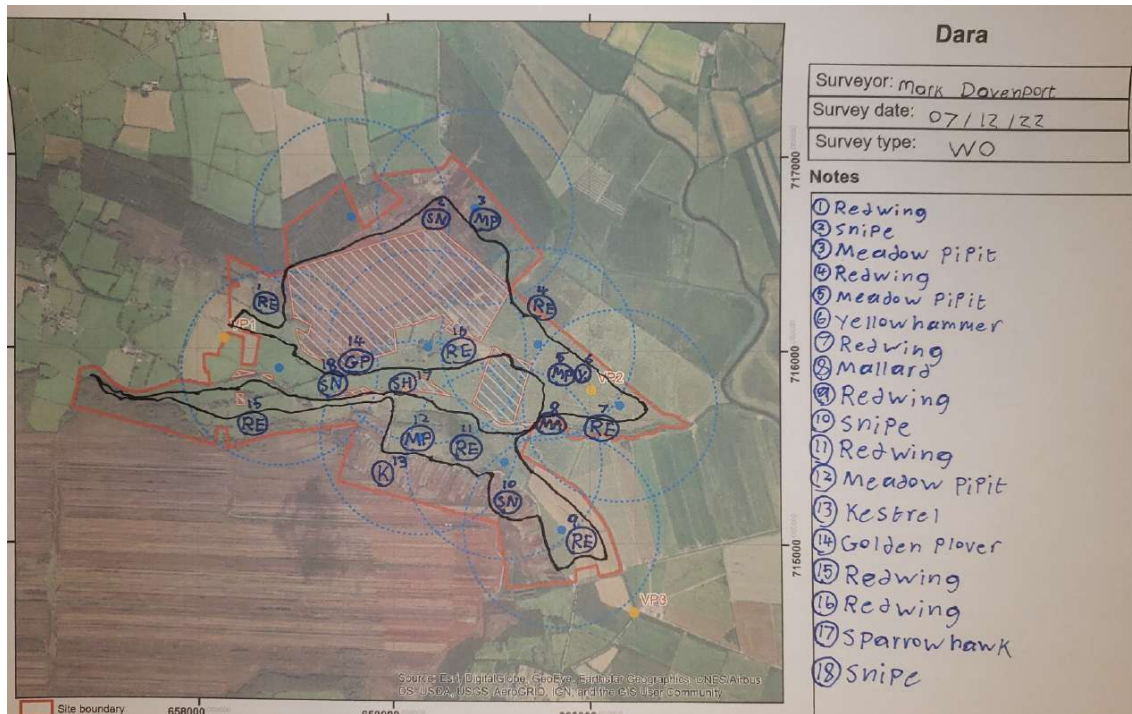


## Winter Walkover - 31/11/22





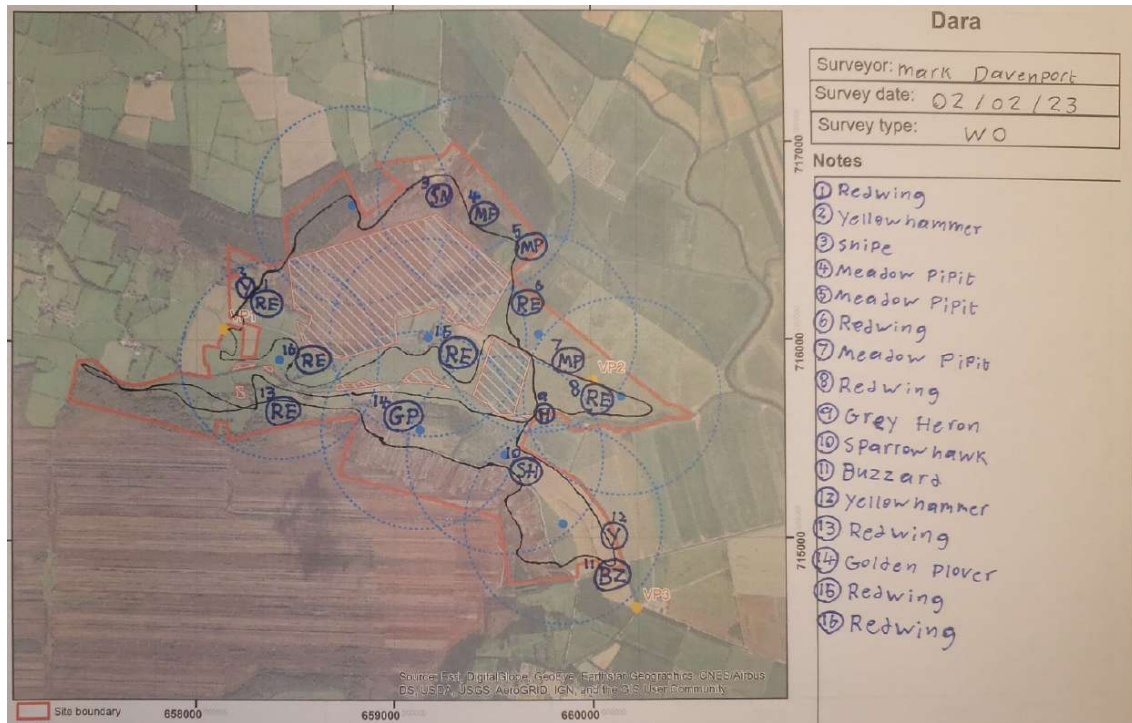
## Winter Walkover – 7/12/22



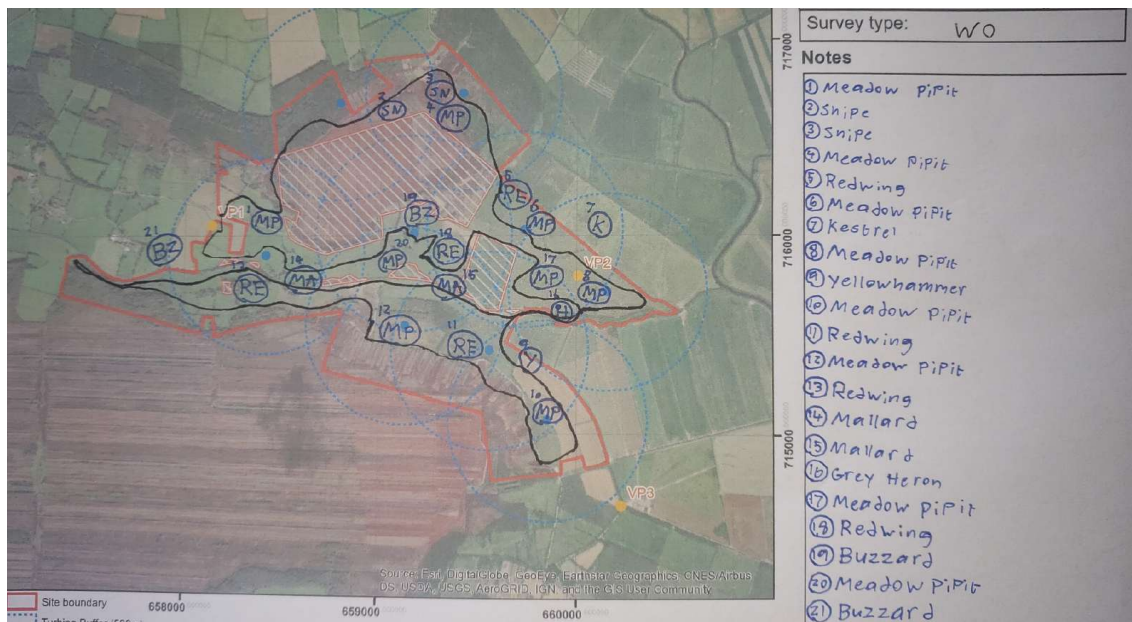
## Winter Walkover - 12/01/2023



## Winter Walkover – 2/2/23



## Winter Walkover - 02/03/23





## Breeding Walkover Survey Data and Maps

| Survey date | Surv<br>eyor | Map<br>label | Species      | Number | Sex/ age | Habitat | Comments                          |
|-------------|--------------|--------------|--------------|--------|----------|---------|-----------------------------------|
| 07/04/2022  | GW           |              | Meadow Pipit | 6      | Mixed    |         | Ground feeding                    |
| 07/04/2022  | GW           |              | Yellowhammer | 1      |          |         | Ground feeding                    |
| 08/04/2022  | GW           |              | Kestrel      | 1      | Male     |         | Hunting                           |
| 08/04/2022  | GW           |              | Meadow Pipit | 1      | Adult    |         |                                   |
| 08/04/2022  | GW           |              | Yellowhammer | 4      | Mixed    |         |                                   |
| 21/04/2022  | GW           |              | Grey Wagtail | 1      | Male     |         | Carrying food                     |
| 21/04/2022  | GW           |              | Kestrel      | 1      | Female   |         | Hunting                           |
| 21/04/2022  | GW           |              | Meadow Pipit | 6      | Mixed    |         |                                   |
| 21/04/2022  | GW           |              | Yellowhammer | 1      | Male     |         | Singing                           |
| 21/04/2022  | GW           |              | Yellowhammer | 2      | Pair     |         | Pair present                      |
| 21/04/2022  | GW           |              | Yellowhammer | 1      | Male     |         | Singing                           |
| 12/05/2022  | GW           |              | Meadow Pipit | 6      | Mixed    |         | Family party                      |
| 12/05/2022  | GW           |              | Yellowhammer | 5      | Pair     |         | 2 pairs plus 1 adult male singing |
| 13/05/2022  | GW           |              | Meadow Pipit | 9      | Mixed    |         | Family party                      |
| 13/05/2022  | GW           |              | Yellowhammer | 9      | Mixed    |         | Family party                      |
| 23/05/2022  | GW           |              | Kestrel      | 1      | Male     |         | Hunting                           |
| 23/05/2022  | GW           |              | Meadow Pipit | 12     | Mixed    |         | Adults with food                  |
| 23/05/2022  | GW           |              | Swift        | 1      | Adult    |         | In flight                         |
| 23/05/2022  | GW           |              | Yellowhammer | 5      | Mixed    |         |                                   |
| 24/05/2022  | GW           |              | Kestrel      | 1      | Male     |         | Hunting                           |
| 24/05/2022  | GW           |              | Meadow Pipit | 3      | Mixed    |         |                                   |
| 24/05/2022  | GW           |              | Yellowhammer | 3      | Mixed    |         | Family party                      |
| 09/06/2022  | GW           |              | Meadow Pipit | 6      | Mixed    |         |                                   |
| 09/06/2022  | GW           |              | Yellowhammer | 1      | Male     |         |                                   |
| 09/06/2022  | GW           |              | Yellowhammer | 4      | Mixed    |         |                                   |
| 10/06/2022  | GW           |              | Meadow Pipit | 1      | Male     |         |                                   |
| 10/06/2022  | GW           |              | Meadow Pipit | 7      | Mixed    |         |                                   |
| 10/06/2022  | GW           |              | Yellowhammer | 4      | Mixed    |         |                                   |
| 10/06/2022  | GW           |              | Yellowhammer | 7      | Mixed    |         |                                   |
| 27/05/2023  | MD           | 1            | Buzzard      | 2      |          | WD4     | Soaring pair                      |
| 27/05/2023  | MD           | 11           | Buzzard      | 2      |          | WS      | pair soaring                      |
| 27/05/2023  | MD           | 22           | Buzzard      | 1      |          | PB      | soaring                           |
| 27/05/2023  | MD           | 12           | Grey Heron   | 1      |          | FW2     | travelling                        |
| 27/05/2023  | MD           | 16           | Kestrel      | 1      |          | PB      | hunting                           |
| 27/05/2023  | MD           | 7            | Lapwing      | 2      |          | GS      | breeding pair/ chick alarm call   |
| 27/05/2023  | MD           | 6            | Mallard      | 1      |          | PB      | flushed                           |
| 27/05/2023  | MD           | 19           | Mallard      | 2      |          | FW2     | flushed                           |
| 27/05/2023  | MD           | 20           | Mallard      | 2      |          | FW2     | foraging                          |
| 27/05/2023  | MD           | 4            | Meadow Pipit | 3      |          | GS      | foraging                          |
| 27/05/2023  | MD           | 5            | Meadow Pipit | 2      |          | PB      | flushed                           |
| 27/05/2023  | MD           | 8            | Meadow Pipit | 4      |          | GS      | flushed/ carrying food            |
| 27/05/2023  | MD           | 10           | Meadow Pipit | 6      |          | GA1     | flushed/ carrying food            |
| 27/05/2023  | MD           | 15           | Meadow Pipit | 4      |          | GS      | foraging                          |
| 27/05/2023  | MD           | 17           | Meadow Pipit | 2      |          | GS      | flushed                           |
| 27/05/2023  | MD           | 21           | Meadow Pipit | 5      |          | GA1     | flushed carrying food             |
| 27/05/2023  | MD           | 24           | Meadow Pipit | 2      |          | GA1     | adult and fledgeling              |
| 27/05/2023  | MD           | 23           | Swift        | 1      |          | GA1     | foraging                          |

| Survey date | Surv<br>eyor | Map<br>label | Species      | Number | Sex/ age  | Habitat | Comments                                                                            |
|-------------|--------------|--------------|--------------|--------|-----------|---------|-------------------------------------------------------------------------------------|
| 27/05/2023  | MD           | 26           | Swift        | 3      |           | PB      | foraging                                                                            |
| 27/05/2023  | MD           | 2            | Yellowhammer | 2      |           | WL1     | foraging                                                                            |
| 27/05/2023  | MD           | 3            | Yellowhammer | 1      |           | WL1     | perched/ singing                                                                    |
| 27/05/2023  | MD           | 9            | Yellowhammer | 1      |           | WL1     | singing                                                                             |
| 27/05/2023  | MD           | 13           | Yellowhammer | 1      |           | WL1     | perched                                                                             |
| 27/05/2023  | MD           | 14           | Yellowhammer | 2      |           | GA1     | foraging                                                                            |
| 27/05/2023  | MD           | 18           | Yellowhammer | 3      |           | GA1     | foraging                                                                            |
| 27/05/2023  | MD           | 25           | Yellowhammer | 1      |           | GA1     | singing                                                                             |
| 03/06/2023  | MD           | 11           | Buzzard      | 1      | F/A & Juv | GA1     | Soaring                                                                             |
| 03/06/2023  | MD           | 17           | Buzzard      | 1      | M/A       | GA1     | Soaring                                                                             |
| 03/06/2023  | MD           | 8            | Curlew       | 2      | A         | GA1     | 2 Possible adult Curlew calling<br>and alarm calling on possible<br>breeding ground |
| 03/06/2023  | MD           | 9            | Mallard      | 5      | F/A & Juv | WFW2    | Adult female / 4 Juv                                                                |
| 03/06/2023  | MD           | 16           | Mallard      | 2      | M/A       | FW2     | Flushed                                                                             |
| 03/06/2023  | MD           | 2            | Meadow Pipit | 2      | A         | GS      | Foraging                                                                            |
| 03/06/2023  | MD           | 3            | Meadow Pipit | 2      | A & Juv   | PB      | Foraging                                                                            |
| 03/06/2023  | MD           | 4            | Meadow Pipit | 5      |           | GA1     | Foraging                                                                            |
| 03/06/2023  | MD           | 6            | Meadow Pipit | 3      | A         | GA1     | Foraging                                                                            |
| 03/06/2023  | MD           | 14           | Meadow Pipit | 2      | A         | GS      | Foraging                                                                            |
| 03/06/2023  | MD           | 19           | Meadow Pipit | 5      | A         | GA1     | Foraging                                                                            |
| 03/06/2023  | MD           | 10           | Swift        | 4      | A         | GA1     | Foraging                                                                            |
| 03/06/2023  | MD           | 18           | Swift        | 3      | A         | GA1     | Foraging                                                                            |
| 03/06/2023  | MD           | 1            | Yellowhammer | 4      | m& f/ A   | WL1     | Perched                                                                             |
| 03/06/2023  | MD           | 5            | Yellowhammer | 2      | M/A       | WL1     | Calling                                                                             |
| 03/06/2023  | MD           | 7            | Yellowhammer | 1      | M/A       | GA1     | Calling                                                                             |
| 03/06/2023  | MD           | 12           | Yellowhammer | 2      | M&F/ A    | GA1     | Foraging                                                                            |
| 03/06/2023  | MD           | 13           | Yellowhammer | 1      | M/A       | FW1     | Calling                                                                             |
| 03/06/2023  | MD           | 15           | Yellowhammer | 3      | M&F/ A    | WL1     | Perched                                                                             |
| 03/06/2023  | MD           | 20           | Yellowhammer | 2      | M&F/ A    | GA1     | Foraging                                                                            |
| 10/07/2023  | MD           | 5            | Buzzard      | 1      | F/A       | GA1     | Travelling                                                                          |
| 10/07/2023  | MD           | 11           | Buzzard      | 1      | A         | GA1     | Saoring                                                                             |
| 10/07/2023  | MD           | 9            | Mallard      | 3      | M&F A     | GA1     | Travelling                                                                          |
| 10/07/2023  | MD           | 2            | Meadow Pipit | 3      | A         | PB      | Foraging/ Displaying                                                                |
| 10/07/2023  | MD           | 3            | Meadow Pipit | 4      | A& JUV    | PB      | Foraging                                                                            |
| 10/07/2023  | MD           | 4            | Meadow Pipit | 2      | A         | PB      | Travelling                                                                          |
| 10/07/2023  | MD           | 6            | Meadow Pipit | 6      | A&JUV     | GA1     | Foraging/ travelling                                                                |
| 10/07/2023  | MD           | 12           | Meadow Pipit | 4      | A         | PB      | Foraging                                                                            |
| 10/07/2023  | MD           | 14           | Meadow Pipit | 9      | A& JUV    | GA1     | Foraging/ Displaying                                                                |
| 10/07/2023  | MD           | 8            | Swift        | 3      | A         | GA1     | Foraging                                                                            |
| 10/07/2023  | MD           | 10           | Swift        | 2      | A         | GA1     | Foraging                                                                            |
| 10/07/2023  | MD           | 1            | Yellowhammer | 2      | M/A       | WL1     | Calling                                                                             |
| 10/07/2023  | MD           | 7            | Yellowhammer | 1      | F/A       | GA1     | Foraging                                                                            |
| 10/07/2023  | MD           | 13           | Yellowhammer | 3      | M&F A     | WL1     | Foraging                                                                            |
| 10/07/2023  | MD           | 15           | Yellowhammer | 2      | M/A       | WL1     | Calling                                                                             |
| 05/08/2023  | MD           | 6            | Buzzard      | 1      | A         | WL1     | Perched                                                                             |
| 05/08/2023  | MD           | 9            | Grey Heron   | 1      | A         | FW2     | Flushed                                                                             |
| 05/08/2023  | MD           | 3            | Meadow Pipit | 6      | A         | GA1     | Foraging                                                                            |
| 05/08/2023  | MD           | 4            | Meadow Pipit | 11     | A         | GA1     | Foraging                                                                            |
| 05/08/2023  | MD           | 7            | Meadow Pipit | 5      | A         | GA1     | Foraging/ Travelling                                                                |



| Survey date | Surveyor | Map label | Species       | Number | Sex/ age | Habitat | Comments             |
|-------------|----------|-----------|---------------|--------|----------|---------|----------------------|
| 05/08/2023  | MD       | 8         | Meadow Pipit  | 4      | A        | GA1     | Travelling/ Perched  |
| 05/08/2023  | MD       | 10        | Meadow Pipit  | 7      | A        | GA1     | Foraging/ flushed    |
| 05/08/2023  | MD       | 2         | Swift         | 2      | A        | GA1     | Foraging             |
| 05/08/2023  | MD       | 1         | Yellowhammer  | 2      | M&F A    | WL2     | Foraging             |
| 05/08/2023  | MD       | 5         | Yellowhammer  | 1      | M/A      | GA1     | Foraging             |
| 05/08/2023  | MD       | 11        | Yellowhammer  | 1      | M/A      | GA1     | Calling              |
| 15/09/2023  | MD       | 12        | Buzzard       | 1      | JUV      | WS      | Perched              |
| 15/09/2023  | MD       | 20        | Golden Plover | 8      |          | PB      | Travelling           |
| 15/09/2023  | MD       | 7         | Mallard       | 3      | M&F A    | FW2     | Flushed              |
| 15/09/2023  | MD       | 15        | Mallard       | 1      | M/A      | FW2     | Flushed              |
| 15/09/2023  | MD       | 2         | Meadow Pipit  | 4      | A        | PB      | Foraging/ Travelling |
| 15/09/2023  | MD       | 5         | Meadow Pipit  | 7      | A        | GA1     | Foraging/ Flushed    |
| 15/09/2023  | MD       | 9         | Meadow Pipit  | 5      |          | PB      | Travelling           |
| 15/09/2023  | MD       | 11        | Meadow Pipit  | 2      | A        | PB      | Foraging             |
| 15/09/2023  | MD       | 14        | Meadow Pipit  | 1      | A        | GA1     | Flushed              |
| 15/09/2023  | MD       | 16        | Meadow Pipit  | 5      | A        | GA1     | Foraging/ Flushed    |
| 15/09/2023  | MD       | 18        | Meadow Pipit  | 2      | A        | GA1     | Foraging             |
| 15/09/2023  | MD       | 3         | Snipe         | 1      |          | PB      | Flushed              |
| 15/09/2023  | MD       | 4         | Snipe         | 1      |          | PB      | Flushed              |
| 15/09/2023  | MD       | 8         | Snipe         | 1      |          | GA1     | Flushed              |
| 15/09/2023  | MD       | 10        | Sparrowhawk   | 1      | M/A      | WS      | Hunting              |
| 15/09/2023  | MD       | 1         | Yellowhammer  | 1      | F/A      | GA1     | Foraging             |
| 15/09/2023  | MD       | 6         | Yellowhammer  | 1      |          | WL1     | Perched              |
| 15/09/2023  | MD       | 13        | Yellowhammer  | 2      | M&F A    | GA1     | Foraging             |
| 15/09/2023  | MD       | 17        | Yellowhammer  | 1      | A        | GA1     | Travelling           |
| 15/09/2023  | MD       | 19        | Yellowhammer  | 1      | M/A      | WL1     | Perched              |

[illegible][illegible]



# Breeding Walkover - 21/4/22 (early AM)



# Breeding Walkover - 21/4/22 (late AM)







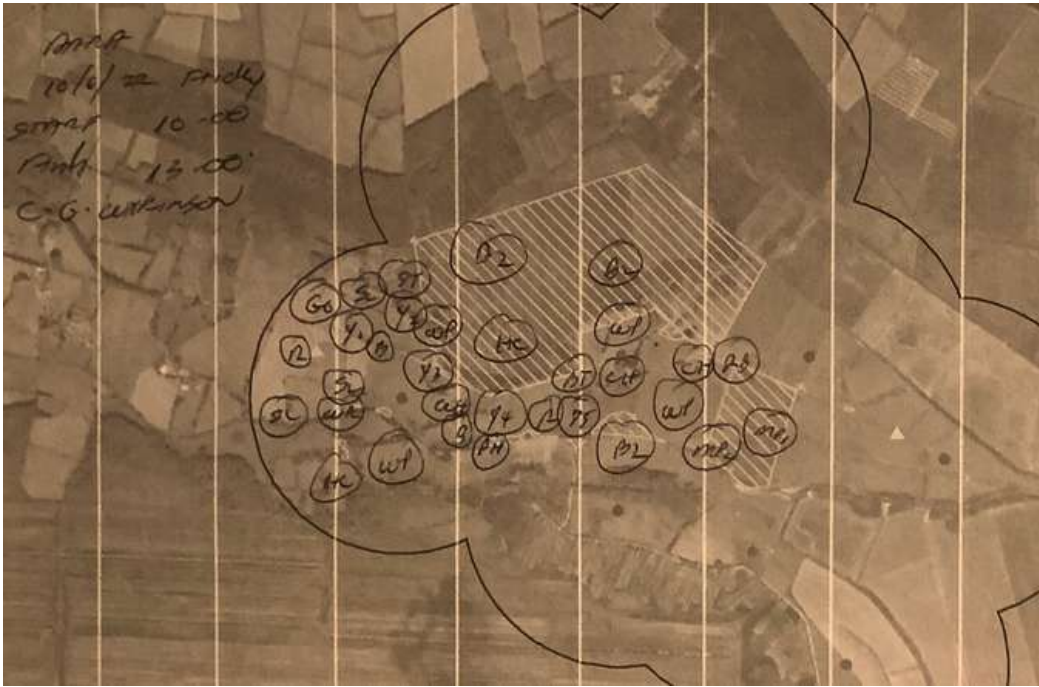
[illegible]

DARPA  
9/6/22 Thursday  
TAN 19-30  
SNDH 22-30  
C.G. Wilkinson

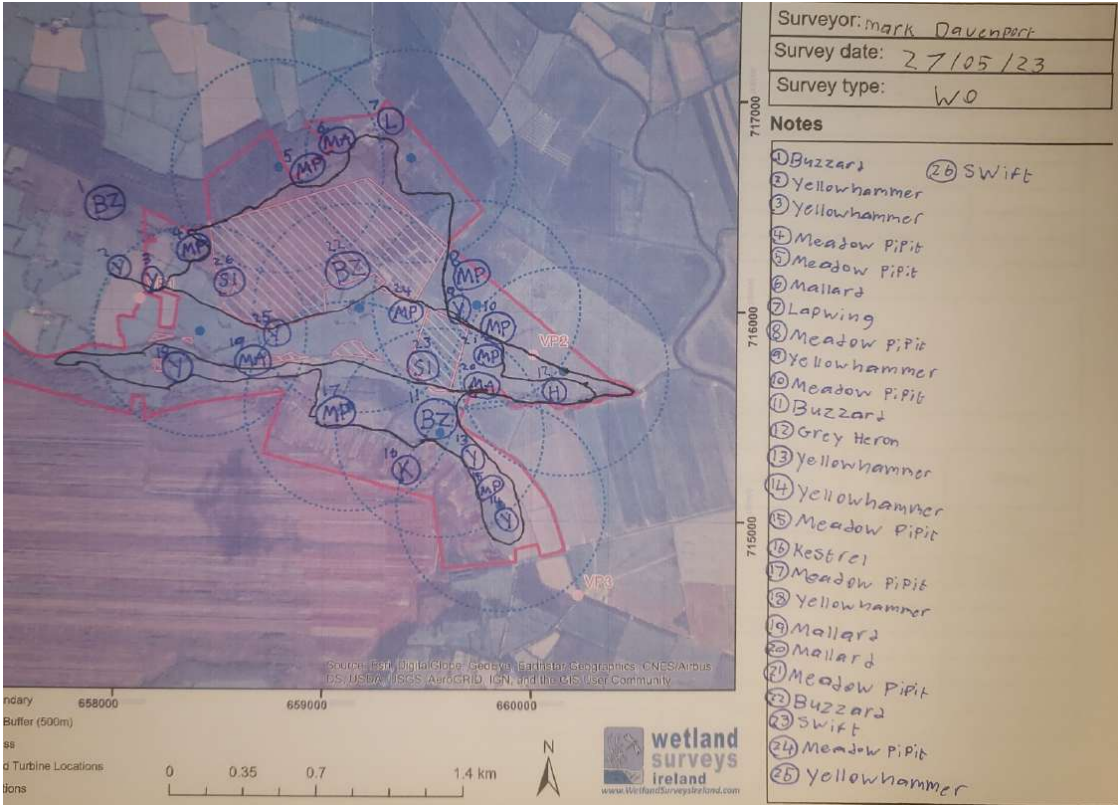
[illegible]



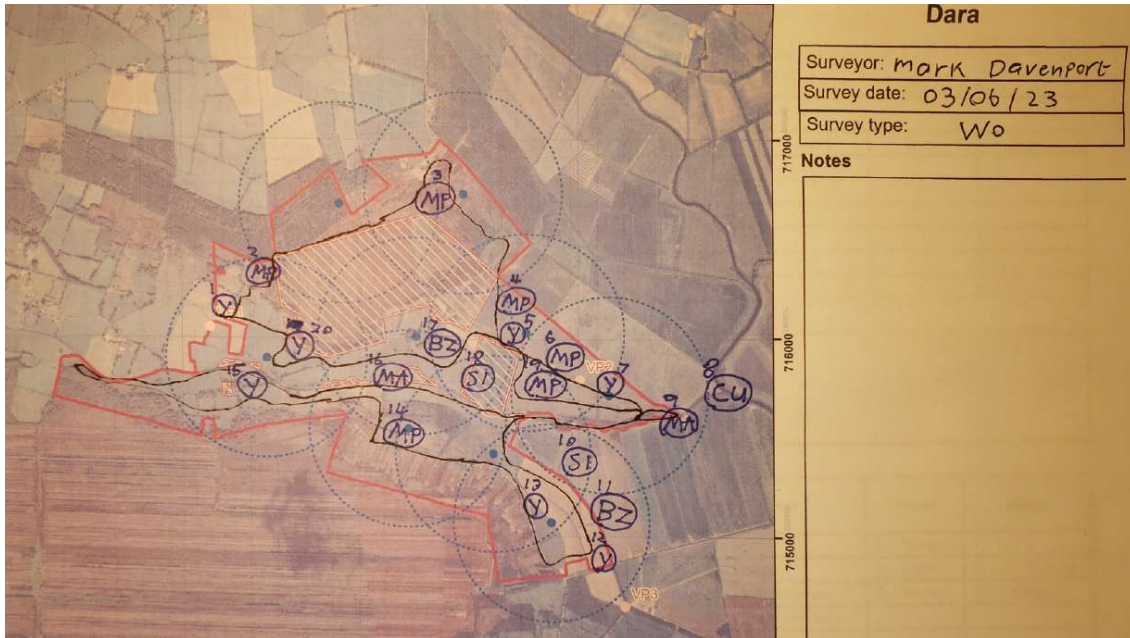
Breeding Walkover - 10/6/22 AM (late)



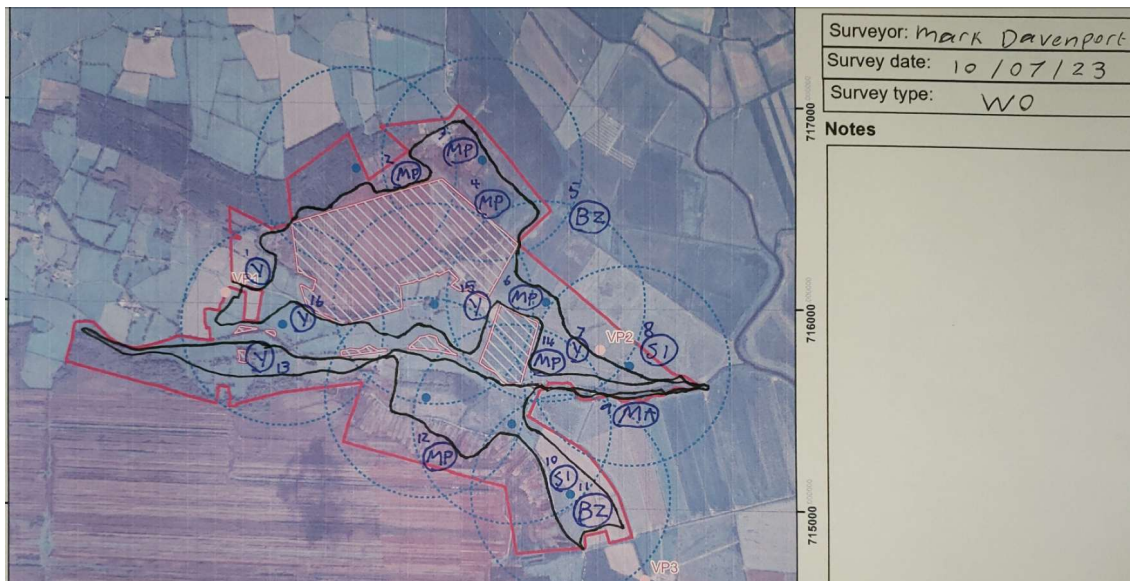
Breeding Walkover - 27/05/23



### Breeding Walkover - 03/06/23

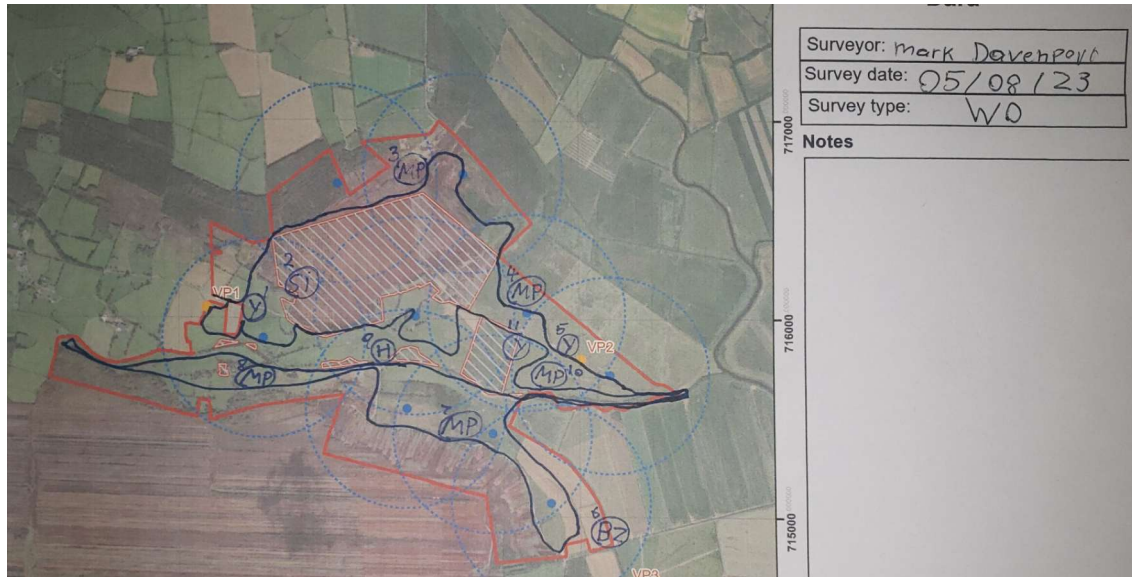


### Breeding Walkover - 10/07/23

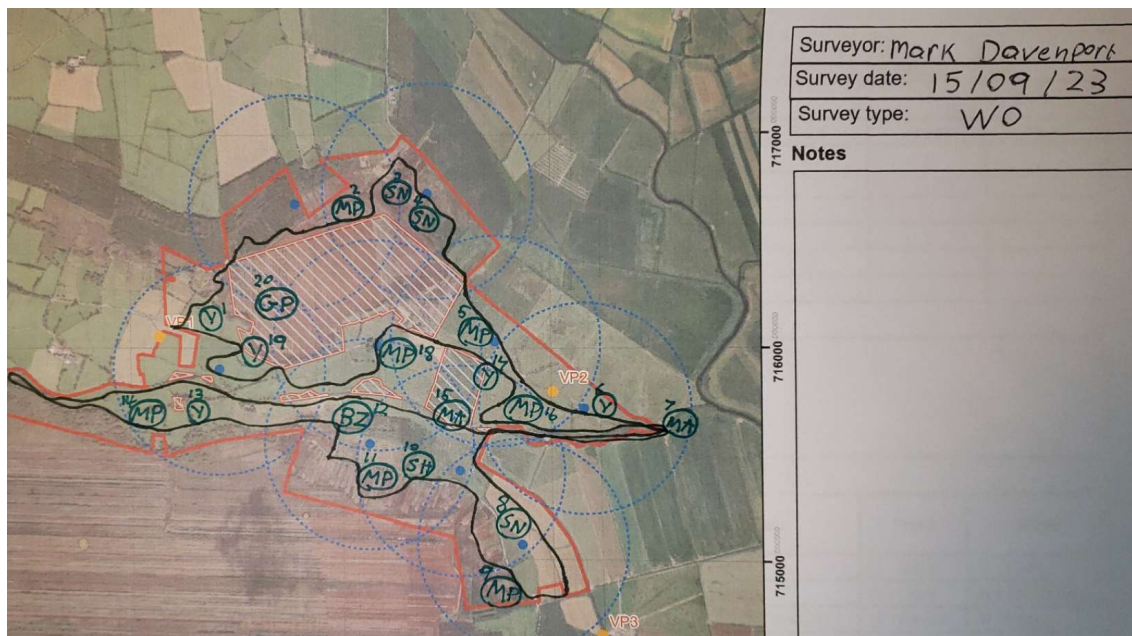




# Breeding Walkover - 05/08/23



# Breeding Walkover - 15/09/23







## APPENDIX 10.4.iii

Sensitive Species Survey Confidential  
Information Internal Use Only





## **Appendix 4a III with Maps**

**Confidential information**

**For internal use only**

### **Sensitive Species Survey Data and Maps**

*Maps showing exact location data of breeding sites of sensitive species are confidential and have been submitted to the planning Authorities, National Parks and Wildlife service and marked as confidential information and for internal use only, and additional version of the appendix has been prepared without maps for public file.*

## Woodcock Survey Data and Maps

June 2025

| Survey date | Transect | Observation No | Species  | BTO code | Number | Sex/ age | Activity | Comments                                                                                |
|-------------|----------|----------------|----------|----------|--------|----------|----------|-----------------------------------------------------------------------------------------|
| 23/06/2025  | 1        | 1              | Woodcock | WK       | 2      | A M&F    | Roding   | Male displaying and calling over forestry. Followed closely by second WK, likely female |
| 23/06/2025  | 1        | 2              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding NE over forestry                                                            |
| 23/06/2025  | 1        | 3              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding SW over forestry                                                            |
| 23/06/2025  | 1        | 4              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding SE over forestry                                                            |
| 23/06/2025  | 1        | 5              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding NE over forestry                                                            |
| 23/06/2025  | 1        | 6              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding NE over forestry                                                            |
| 23/06/2025  | 1        | 7              | Woodcock | WK       | 2      | A M&F    | Roding   | Male roding SW over forestry followed closely by female                                 |

### Woodcock Survey: 23/06/2025





## Breeding Wader (Curlew) Surveys Data and Maps

April to June 2022  
and  
April to June 2025

| Survey date | Transect / VP | Observation No | Species | Number | Sex/ age | Habitat | Comments                                                                       |
|-------------|---------------|----------------|---------|--------|----------|---------|--------------------------------------------------------------------------------|
| 13/04/2022  | VP            | 1              | Curlew  | 0      |          | GS      | No obs                                                                         |
| 21/05/2022  | VP            | 1              | Curlew  | 3      |          | GS      | Three curlew observed in flight                                                |
| 31/05/2022  | VP            | 2              | Curlew  | 1      |          | GS      | Adult female feeding                                                           |
| 01/06/2022  | VP            | na             | Curlew  | 0      |          | GS      | No obs                                                                         |
| 20/04/2025  | 1             | 1              | Curlew  | 1      | F/A      | GS      | Foraging                                                                       |
| 20/04/2025  | 1             | 2              | Curlew  | 1      | M/A      | GS      | Flushed then displayed before landing to forage                                |
| 27/05/2025  | 1             | na             | Curlew  | 0      |          | GS      | No curlew recorded, Curlew last audio recorded on 7th May. Two snipe drumming. |
| 17/06/2025  | 1             | na             | Curlew  |        |          |         | No obs                                                                         |

## Breeding Curlew Survey: 13/04/2022



## Breeding Curlew Survey: 21/05/2022





## Breeding Curlew Survey: 31/05/2022



## Breeding Curlew Survey: 20/04/2025



## Breeding Raptor Surveys Data and Maps

May to July 2023

| Date       | Map reference | VP    | Species     | BTO code | Number | Time  | Activity      | Comments                                                                                |
|------------|---------------|-------|-------------|----------|--------|-------|---------------|-----------------------------------------------------------------------------------------|
| 01/06/2023 | 1             | BRVP3 | Buzzard     | BZ       | 1      | 08:18 | Travelling    | Adult female BZ flying SE at approx 60 metres. Lost behind forestry                     |
| 01/06/2023 | 2             | BRVP3 | Kestrel     | K        | 1      | 07:52 | Hunting       | Adult male K hunting. Made one unsuccessful kill attempt.                               |
| 01/06/2023 | 3             | BRVP3 | Buzzard     | BZ       | 1      | 08:15 | Soaring       | BZ rising on thermal to over 150 metres . Drifted South                                 |
| 06/07/2023 | 1             | BRVP3 | Sparrowhawk | SH       | 1      | 07:16 | Carrying prey | Adult male SH carrying passerine prey into forestry. Nest with chick likely in forestry |



[illegible]

Confidential Info

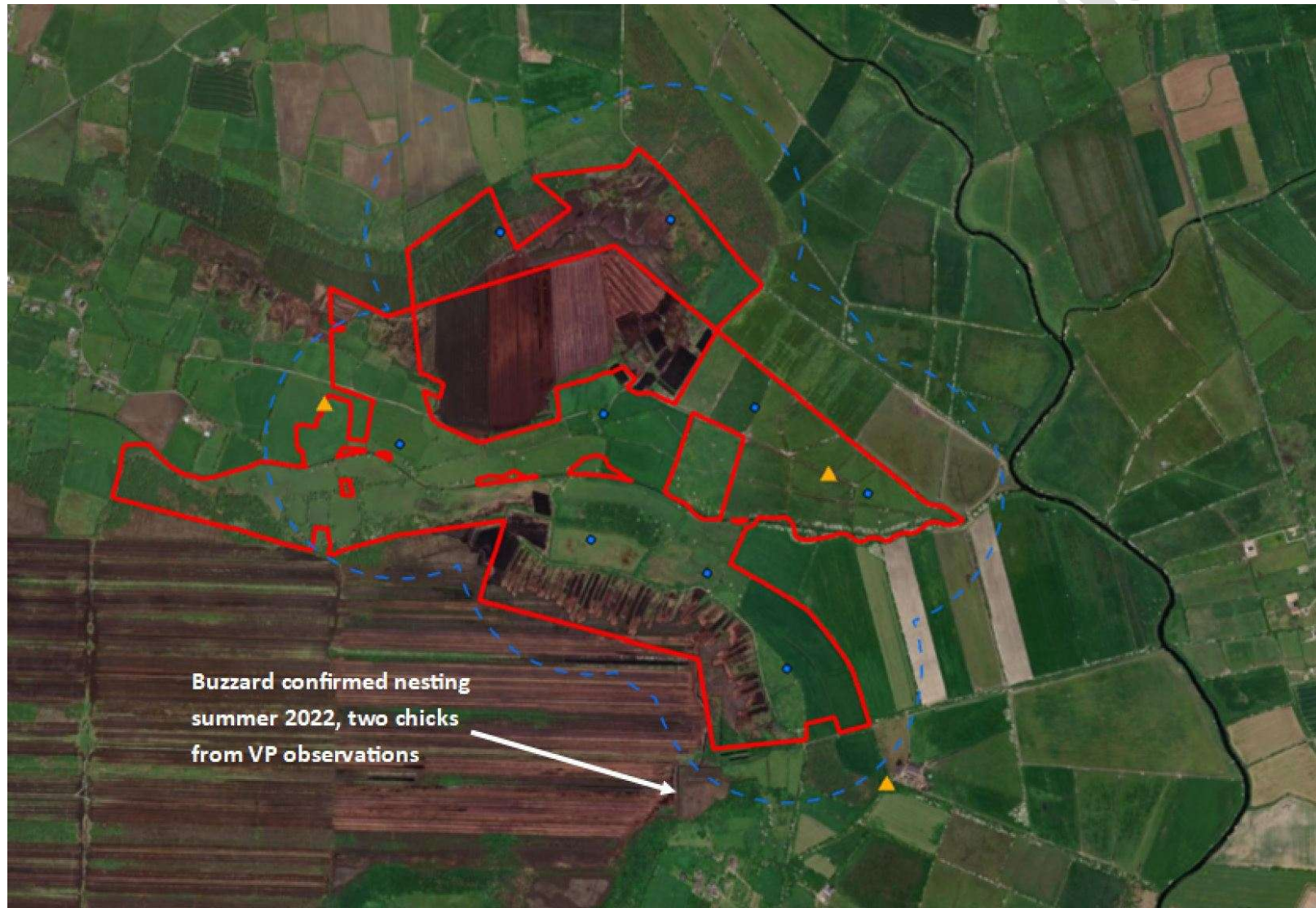
is  No Access



## Breeding Lapwing Nest Location:



## Buzzard Nest Location: Summer 2022





Confidential Information for Internal use





## APPENDIX 10.4.iii

### Walkover Surveys Data without Maps





## Appendix 4a III without Maps

### Woodcock Survey Data

June 2025

| Survey date | Transect | Observation No | Species  | BTO code | Number | Sex/ age | Activity | Comments                                                                                |
|-------------|----------|----------------|----------|----------|--------|----------|----------|-----------------------------------------------------------------------------------------|
| 23/06/2025  | 1        | 1              | Woodcock | WK       | 2      | A M&F    | Roding   | Male displaying and calling over forestry. Followed closely by second WK, likely female |
| 23/06/2025  | 1        | 2              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding NE over forestry                                                            |
| 23/06/2025  | 1        | 3              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding SW over forestry                                                            |
| 23/06/2025  | 1        | 4              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding SE over forestry                                                            |
| 23/06/2025  | 1        | 5              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding NE over forestry                                                            |
| 23/06/2025  | 1        | 6              | Woodcock | WK       | 1      | A/M      | Roding   | Male roding NE over forestry                                                            |
| 23/06/2025  | 1        | 7              | Woodcock | WK       | 2      | A M&F    | Roding   | Male roding SW over forestry followed closely by female                                 |

*Note: Maps showing exact location data of breeding sites of sensitive species are confidential and have been submitted to the planning Authorities, National Parks and Wildlife service and marked as confidential information and for internal use only.*

### Breeding Wader (Curlew) Surveys Data

April to June 2022

and

April to June 2025

| Survey date | Transect / VP | Observation No | Species | Number | Sex/ age | Habitat | Comments                                                                       |
|-------------|---------------|----------------|---------|--------|----------|---------|--------------------------------------------------------------------------------|
| 13/04/2022  | VP            | 1              | Curlew  | 0      |          | GS      | No obs                                                                         |
| 21/05/2022  | VP            | 1              | Curlew  | 3      |          | GS      | Three curlew observed in flight                                                |
| 31/05/2022  | VP            | 2              | Curlew  | 1      |          | GS      | Adult female feeding                                                           |
| 01/06/2022  | VP            | na             | Curlew  | 0      |          | GS      | No obs                                                                         |
| 20/04/2025  | 1             | 1              | Curlew  | 1      | F/A      | GS      | Foraging                                                                       |
| 20/04/2025  | 1             | 2              | Curlew  | 1      | M/A      | GS      | Flushed then displayed before landing to forage                                |
| 27/05/2025  | 1             | na             | Curlew  | 0      |          | GS      | No curlew recorded, Curlew last audio recorded on 7th May. Two snipe drumming. |
| 17/06/2025  | 1             | na             | Curlew  |        |          |         | No obs                                                                         |

*Note: Maps showing exact location data of breeding sites of sensitive species are confidential and have been submitted to the planning Authorities, National Parks and Wildlife service and marked as confidential information and for internal use only.*

## Breeding Raptor Surveys Data

May to July 2023

| Date       | Map reference | VP    | Species     | BTO code | Number | Time  | Activity      | Comments                                                                                |
|------------|---------------|-------|-------------|----------|--------|-------|---------------|-----------------------------------------------------------------------------------------|
| 01/06/2023 | 1             | BRVP3 | Buzzard     | BZ       | 1      | 08:18 | Travelling    | Adult female BZ flying SE at approx 60 metres. Lost behind forestry                     |
| 01/06/2023 | 2             | BRVP3 | Kestrel     | K        | 1      | 07:52 | Hunting       | Adult male K hunting. Made one unsuccessful kill attempt.                               |
| 01/06/2023 | 3             | BRVP3 | Buzzard     | BZ       | 1      | 08:15 | Soaring       | BZ rising on thermal to over 150 metres . Drifted South                                 |
| 06/07/2023 | 1             | BRVP3 | Sparrowhawk | SH       | 1      | 07:16 | Carrying prey | Adult male SH carrying passerine prey into forestry. Nest with chick likely in forestry |

*Note: Maps showing exact location data of breeding sites of sensitive species are confidential and have been submitted to each Planning Authorities, National Parks and Wildlife service and marked as confidential information and internal use only.*



## APPENDIX 10.5

### Collision Risk Model





# **Derrynadarragh Wind Farm**

## **Collision Risk Modelling**

**Prepared for:**

**Dara Energy Limited**

**August 2025**

**By**



**Wetland Surveys Ireland Ltd.**

**The Shed @ The Mill**

**Killarney Road**

**Gortamullin**

**Kenmare**

**Co Kerry**

**T: 064 6642524**

**E: [info@wetlandsurveys.ie](mailto:info@wetlandsurveys.ie)**

**W: [www.WetlandSurveys.ie](http://www.WetlandSurveys.ie)**

Document Control Sheet

|                |                                         |
|----------------|-----------------------------------------|
| Client         | Dara Energy Limited                     |
| Project Title  | Derrynadarragh Collision Risk Modelling |
| Document Title | Collision Risk Modelling                |
| Project Number | WS0818                                  |
| Document No.   | DaraCRM_002                             |

| Revision                | Status | Author | Review | Approved | Date       |
|-------------------------|--------|--------|--------|----------|------------|
| 001                     | Draft  | MCG    |        |          | 13/03/2025 |
|                         |        |        | PC     |          | 21/08/2025 |
| 002                     |        |        | MCG    | PC       | 26/08/2025 |
|                         |        |        |        |          |            |
|                         |        |        |        |          |            |
| Wetland Surveys Ireland |        |        |        |          |            |



## CONTENTS

|                      | Page |
|----------------------|------|
| 1 INTRODUCTION ..... | 3    |
| 2 METHODOLOGY .....  | 4    |
| 3 RESULTS .....      | 12   |
| 4 REFERENCES .....   | 19   |

## FIGURES

|                                                                                                                                                 |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---|
| FIGURE 1: LAYOUT OF DERRYNADARRAGH WINDFARM SHOWING SITE BOUNDARY, TURBINE LOCATION (No. 9), BIRD SURVEY AREA AND VANTAGE POINT LOCATIONS. .... | 3 |
| FIGURE 2: VIEWSHED FROM VP1 (20M HEIGHT).....                                                                                                   | 7 |
| FIGURE 3: VIEWSHED FROM VP2 (20M HEIGHT).....                                                                                                   | 7 |
| FIGURE 4: VIEWSHED FROM VP3 (20M HEIGHT).....                                                                                                   | 8 |
| FIGURE 5: OVERALL COVERAGE OF STUDY AREA BY THREE VP VIEWSHEDS (20M HEIGHT). ....                                                               | 8 |

## TABLES

|                                                                                                                                                                                       |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| TABLE 1: BIRD BIOMETRICS DATA FOR TARGET SPECIES.....                                                                                                                                 | 5  |
| TABLE 2: TURBINE PARAMETERS FOR THE PROPOSED TURBINE MODEL AT DERRYNADARRAGH WIND FARM. ....                                                                                          | 6  |
| TABLE 3: DETAILS OF VANTAGE POINT WATCHES CARRIED OUT AT DERRYNADARRAGH WIND FARM.....                                                                                                | 9  |
| TABLE 5: BIRD SPECIES RECORDED DURING VP WATCHES AT THE PROPOSED DERRYNADARRAGH WIND FARM. ANNEX I REFERS TO WHETHER THE SPECIES IS LISTED IN ANNEX I OF THE EU BIRDS DIRECTIVE. .... | 12 |
| TABLE 6: AVERAGE BIRD DENSITY (BIRDS / KM <sup>2</sup> ) OF BIRD SPECIES RECORDED DURING VP WATCHES AT THE PROPOSED DERRYNADARRAGH WIND FARM .....                                    | 12 |
| TABLE 8: PROPORTION OF BIRDS FLYING AT RISK HEIGHT .....                                                                                                                              | 13 |
| TABLE 9: EXPECTED NUMBER OF COLLISIONS PER YEAR (ASSUMING AVOIDANCE BEHAVIOUR) FOR BIRD SPECIES AT THE PROPOSED DERRYNADARRAGH WIND FARM .....                                        | 14 |
| TABLE 10: UNCERTAINTY VALUE ASSOCIATED WITH BIRD DENSITY FOR EACH TARGET SPECIES.....                                                                                                 | 15 |
| TABLE 11: COMBINED UNCERTAINTY VALUES FOR EACH TARGET SPECIES.....                                                                                                                    | 17 |
| TABLE 12: ESTIMATED NUMBER OF COLLISIONS PER YEAR WITH UNCERTAINTY VALUES .....                                                                                                       | 18 |

## Appendices

Appendix I – Calculating bird density

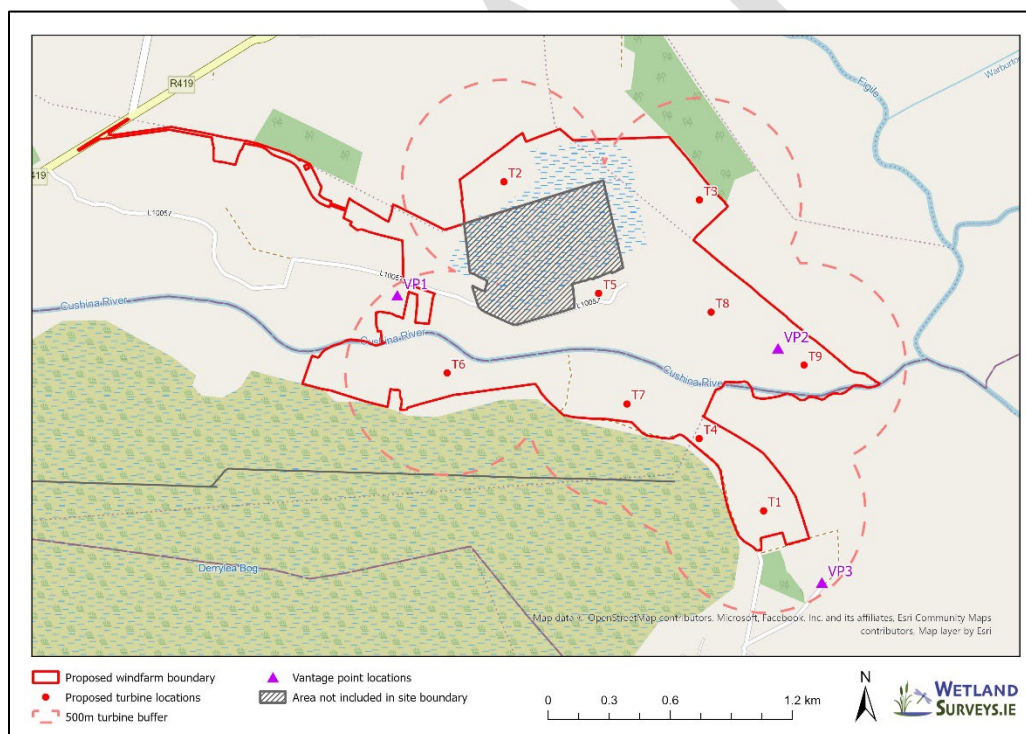
Appendix II – Calculating proportion of birds at risk height

Appendix III – Collision probability (outcome of Stage A – Stage E calculations)

## 1 INTRODUCTION

Wind Farm Developments have the potential to impact bird species in a number of ways, including displacement, barrier effects, habitat effects, and collision risk. Collision risk can be assessed using Collision Risk Modelling (CRM). *Wetland Surveys Ireland Ltd.* were commissioned by *Dara Energy Limited Ltd.* to assess the collision risk for bird species at the proposed Derrynadarragh Wind Farm, Co. Offaly and Co. Kildare.

CRM is a method to estimate the number of birds likely to collide with turbines at a proposed wind farm site. This method uses vantage point data collected during field surveys to calculate the risk of collision. In this case, vantage point data collected over two years (two breeding seasons and two winter seasons) at the proposed Derrynadarragh Wind Farm site was used. The vantage point surveys were undertaken over a 24-month period from October 2021 to September 2023 at two vantage point locations (VP1 and VP2). A third vantage point, VP3, was established in April 2022 and was surveyed along with VP1 and VP2 until September 2023 (see Figure 1). For the purposes of the CRM, the parameters used to inform turbine characteristics are based on the Vestas V-162 model of turbine.



**Figure 1: Layout of Derrynadarragh Windfarm showing site boundary, turbine location (No. 9), bird survey area and Vantage Point locations.**



## 2 METHODOLOGY

The vantage point surveys were carried out following Scottish Natural Heritage guidelines (SNH 2017). CRM uses a mathematical model to estimate the number of birds of a particular species that are likely to collide with the proposed turbines. The CRM method followed here is that of Scottish Natural Heritage, which is also known as the Band Model (Band 2000, Band *et al.* 2007) as updated in 2024 (Band 2024). The excel calculation sheet available for download from the SNH website<sup>1</sup> was used for the current CRM and follows the updated approach of Band (2024). The Collision Risk sheet within the calculation excel requires data to be input relating to the target bird species, the wind farm, and the turbines. These data are then used within Stages A - E of the collision risk calculation, which are clearly delineated within the excel. Additional data input is also required for Stages A, D, and E within the calculation excel.

### 2.1 BIRD DATA

For each target species several parameters must be entered into the excel calculation sheet including bird length, wingspan, and bird flight speed. Bird biometric data were obtained from the Royal Society for the Protection of Birds<sup>2</sup>. It is recommended (Band 2024) that bird biometrics are obtained from standard reference works (e.g. Cramp & Simmons 1983) or from British Trust for Ornithology (BTO) Bird Facts. BTO Bird Facts<sup>3</sup> were consulted in February 2025, however the required biometric data was not displayed for the bird species required. This data was found on the Royal Society for the Protection of Birds website and so was used in place of BTO data (Table 1).

The calculation excel requires a nocturnal activity ranking to be selected for each target species. The ranking ranges from 1-5, where 1 represents no nocturnal activity (birds are inactive at night) and 5 represents high levels of nocturnal activity (birds are as active at night as they are during the day). A ranking of 1 was assigned to all target bird species recorded, except for Golden Plover, Snipe, and Lapwing which were given a nocturnal activity ranking of 2, which represents 25% nocturnal activity (birds are 25% as active at night as they are during the daytime).

For all target bird species it was assumed that flight speed was the same upwind and downwind. The calculations were run for both gliding and or flapping flight depending on the typical flight of each species. Where both gliding and flapping are calculated then the two values are averaged.

---

<sup>1</sup> <https://www.nature.scot/doc/collision-risk-model-onshore-wind-farms-spreadsheet-2024>

<sup>2</sup> <https://www.rspb.org.uk/birds-and-wildlife>

<sup>3</sup> <https://www.bto.org/understanding-birds/welcome-birdfacts>

For each target species ‘normal approach’ or ‘birds on migration’ needed to be specified in the calculation excel. All species recorded during regular vantage point watches were selected as ‘normal approach’.

To account for a bird's ability to detect and avoid turbines, an avoidance factor is applied to the annual collision mortality rate. Based on empirical evidence and ongoing studies, avoidance rates for most species are typically 98-99% or higher (SNH, 2018). For Golden Plover, an avoidance rate of 99.8% was used as it was determined by Gittings (2022) to be appropriate based on a review of four onshore windfarms in the UK. The avoidance rate used for Hen Harrier was 99%, Whooper Swan was 99.5%, and Kestrel was 95%. For the other species included in this collision risk, the SNH guidance specifies a default avoidance rate of 98% (see Table 1).

**Table 1: Bird biometrics data for target species.**

| Species       | Avoidance Rates (%) | Length (m) | Wingspan (m) | Average speed (m/s) |
|---------------|---------------------|------------|--------------|---------------------|
| Buzzard       | 98                  | 0.54       | 1.21         | 11.6                |
| Curlew        | 98                  | 0.55       | 0.9          | 16.3                |
| Golden Plover | 99.8                | 0.28       | 0.72         | 17.9                |
| Hen Harrier   | 99                  | 0.48       | 1.1          | 9.1                 |
| Kestrel       | 95                  | 0.34       | 0.76         | 10.1                |
| Lapwing       | 98                  | 0.3        | 0.85         | 12.8                |
| Mallard       | 98                  | 0.57       | 0.9          | 18.5                |
| Merlin        | 98                  | 0.28       | 0.56         | 11.2                |
| Peregrine     | 98                  | 0.45       | 1.05         | 12.1                |
| Snipe         | 98                  | 0.26       | 0.42         | 17.1                |
| Sparrowhawk   | 98                  | 0.33       | 0.63         | 11.3                |
| Whooper Swan  | 99.5                | 1.5        | 2.2          | 17.3                |
| Woodcock      | 98                  | 0.34       | 0.6          | 17.1                |

*Length and wingspan from RSPB. Flight speed from Alerstam et al. (2007); for Golden plover, value for grey plover was used; for woodcock, value for snipe was used*

## 2.2 WINDFARM DATA

The latitude of Derrynadarragh windfarm is 53.2 degrees (at its most northerly point). This value was entered into the calculation excel which then automatically calculated the total daylight hours per month for the windfarm site. The number of proposed turbines for the site is 9 and this value was also entered into the calculation excel.

### 2.2.1 Turbine Data

The turbine model used to inform the CRM is the Vestas V-162. The turbine parameters as per the manufacturer's specifications are presented in Table 2 were used in the CRM. Blade profile



data (a separate sheet in the calculation excel) were not altered and default values were used, as the specific data for the turbine model was not available.

**Table 2: Turbine parameters for the proposed turbine model at Derrynadarragh Wind Farm.**

| <b>Turbine Model</b>              | <b>V-162 (Vestas)</b>   |
|-----------------------------------|-------------------------|
| <i>Number of turbines</i>         | 9                       |
| <i>Hub height</i>                 | 105m                    |
| <i>Rotor radius</i>               | 81m                     |
| <i>Number of blades</i>           | 3                       |
| <i>Rotation speed<sup>4</sup></i> | 12.1rpm                 |
| <i>Maximum blade width</i>        | 4.3m                    |
| <i>Blade pitch</i>                | 15 degrees <sup>5</sup> |

### 2.3 STAGES OF COLLISION RISK ASSESSMENT

The five stages (A to E) involved in CRM (as per Band 2024) are as follows:

#### **Stage A Flight Activity:**

*Vantage point survey data of birds flying in the study area are used to determine the density of birds flying in the vicinity of the proposed turbines and the proportion flying at risk height (between the lowest and highest points of the rotors).*

#### *Bird Density*

Two years of survey data (October 2021 – September 2023) were used for this CRM analysis. Data was collected at dedicated vantage point (VP) locations overlooking the proposed windfarm site as illustrated in Figure 1. A total of 159 hours of survey effort was carried out at VP1 and VP2 individually over the entire survey period. The total survey effort at VP3 was 117 hours. The survey effort at VP3 was lower than that at VP1 and VP2 as VP3 was only established in Summer 2022. Survey effort per season is summarised in Table 3.

The three VP locations afforded views over the proposed wind farm site and a 500 m buffer around each proposed turbine. The viewshed from each VP is illustrated in Figure 2 - Figure 4 below. The viewsheds were determined by surveyors and confirmed using spatial analyst GIS software tools. Both a 0m (ground level) and 20m (above ground level) viewshed were established for each VP. The viewsheds were used to calculate the area visible from each VP. The cumulative coverage of the survey area by the 20m elevation viewshed from all VPs is illustrated in Figure 5 below.

<sup>4</sup> The dynamic operation range (the rate at which the blades rotate) of the turbines is approximately 4-12.1 revolutions per minute (rpm) which is influenced by wind speed. Taking a precautionary approach the higher rate of 12.1 is used in the CRM.

<sup>5</sup> A pitch value of 15 degrees was used as this is accepted as a recognised average when a turbine is operating at around its mean rotational speed (Band 2024).

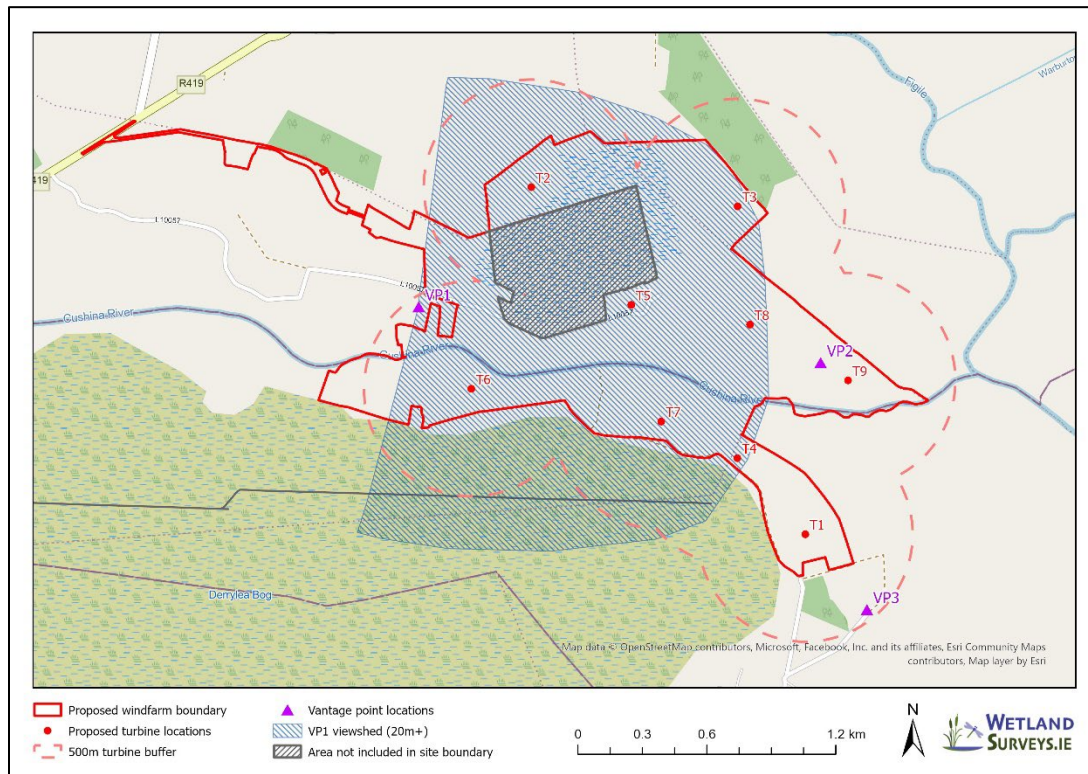


Figure 2: Viewshed from VP1 (20m height).

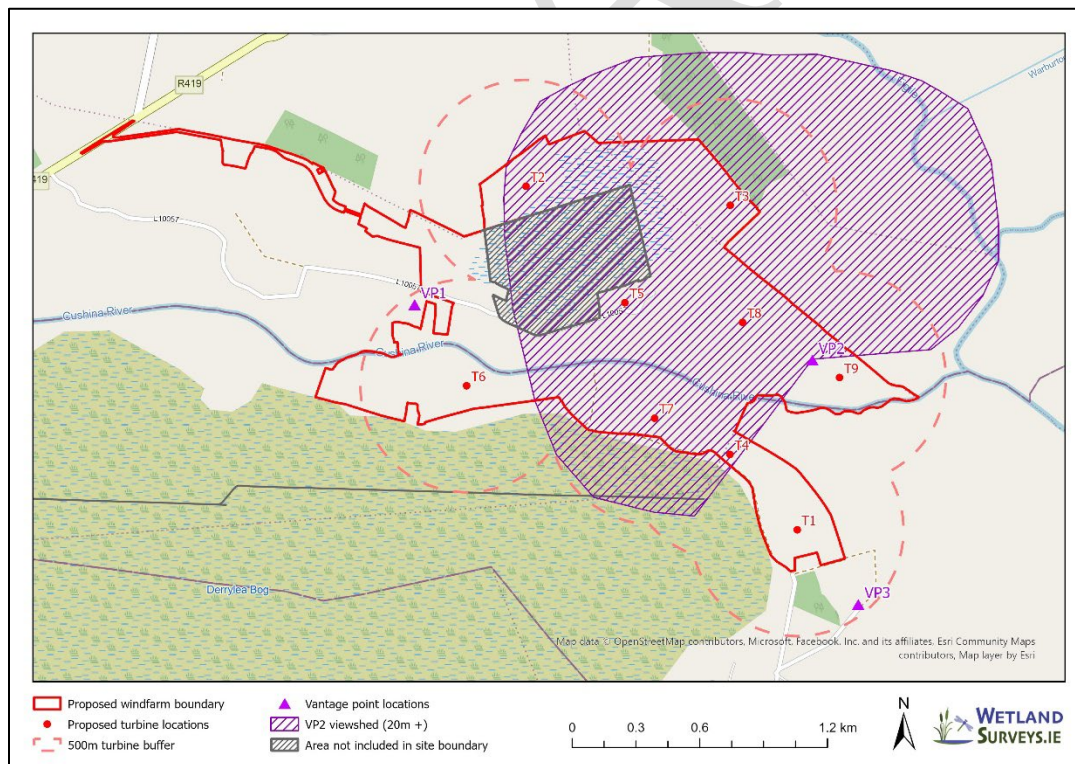


Figure 3: Viewshed from VP2 (20m height).



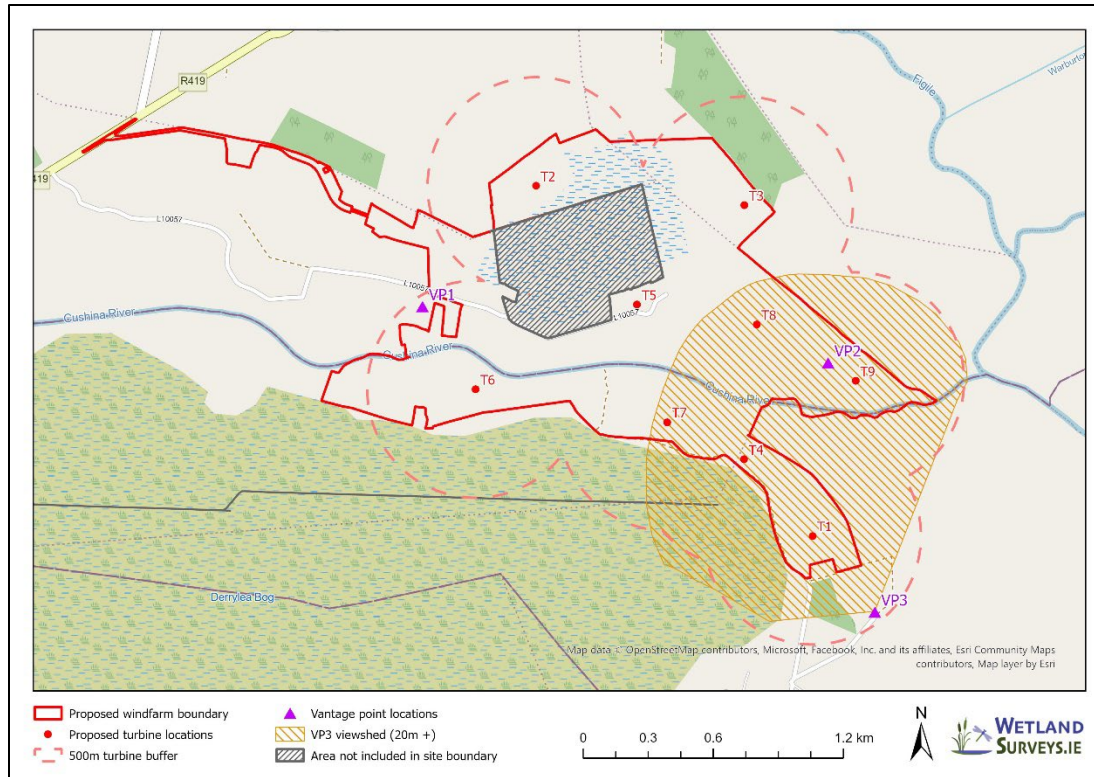


Figure 4: Viewshed from VP3 (20m height).

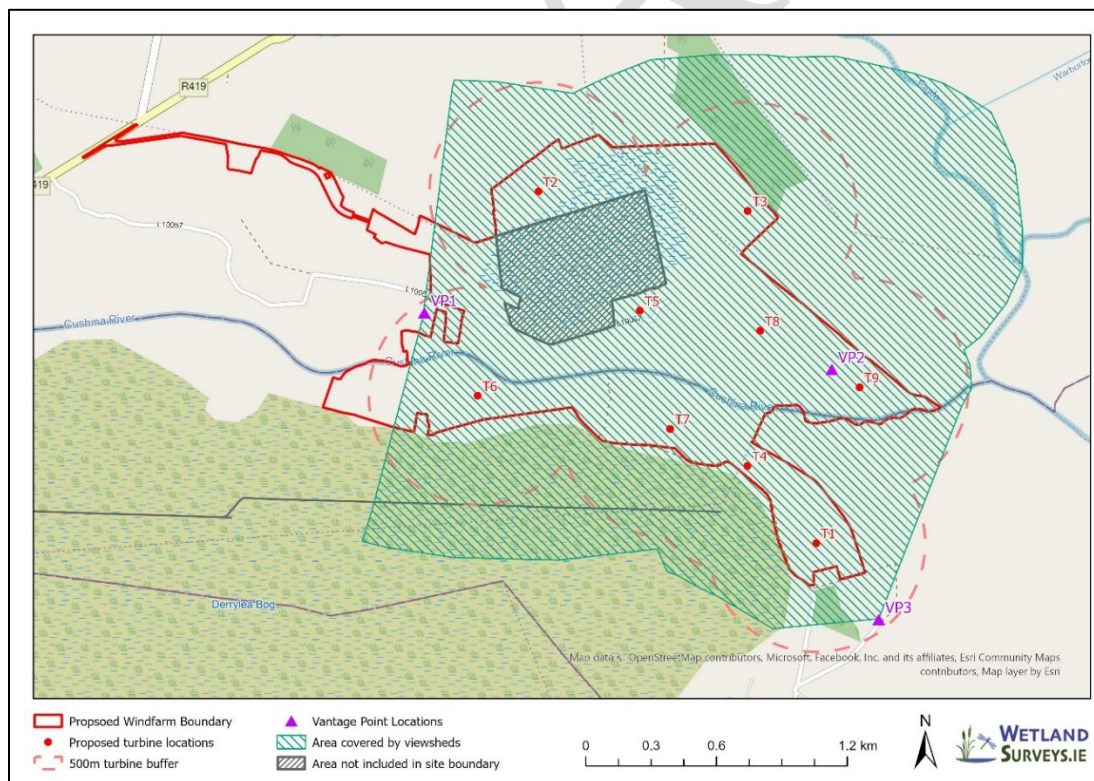


Figure 5: Overall coverage of study area by three VP viewsheds (20m height).



**Table 3: Details of vantage point watches carried out at Derrynadarragh Wind Farm**

|     | <b>Viewshed area (km<sup>2</sup>)</b> | <b>Seasonal surveys</b>                                                                                                            | <b>Total survey effort (hrs)</b> | <b>VP Location</b> |
|-----|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------|
| VP1 | 3.24                                  | Winter (Oct 21 – Mar 22): 36hrs<br>Summer (Apr – Sep 22): 33hrs<br>Winter (Oct 22 – Mar 23): 54hrs<br>Summer (Apr – Sep 23): 36hrs | 159                              | 658138,<br>716055  |
| VP2 | 3.65                                  | Winter (Oct 21 – Mar 22): 36hrs<br>Summer (Apr – Sep 22): 33hrs<br>Winter (Oct 22 – Mar 23): 48hrs<br>Summer (Apr – Sep 23): 42hrs | 159                              | 660008,<br>715795  |
| VP3 | 1.79                                  | Winter (Oct 21 – Mar 22): na<br>Summer (Apr – Sep 22): 33hrs<br>Winter (Oct 22 – Mar 23): 42hrs<br>Summer (Apr – Sep 23): 42hrs    | 117                              | 660224,<br>714647  |

\* VP3 has a lower survey effort compared to VP1 and VP2 as it was not established until April 2022

\* A number of additional watches were undertaken during winter 2022-23 and summer 2023 to increase coverage of the Spring and Autumn migration periods.

Flightlines were recorded during each VP survey, noting the species of bird, number of individuals and time spent flying at various height bands<sup>6</sup>. Any flightlines that occurred entirely outside of the relevant viewshed were excluded from the analysis. Flightlines that partly occurred within the relevant viewshed were clipped to the viewshed and the duration of the flight was recalculated using the proportion of the original flightline occurring within the viewshed. This recalculation assumes that flight height distribution and flight speed were similar in the segments inside and outside of the viewshed.

Multiplying the number of birds by the time recorded flying for each species of interest provided the total flying time for that species during a given season in bird-seconds. This total flying time was then divided by the total watch time (s) and the area surveyed (viewshed) (km<sup>2</sup>) to calculate the average density of birds in flight per km<sup>2</sup>.

Vantage Point data was aggregated into two periods: winter season (October - March) and breeding season (April – September) for each year following the approach used in Band (2024). As there is no significant difference in habitat covered by each of the VP locations, the data for all VPs were also aggregated. There were variations in the level of flight activity recorded for individual species between years, however activity was not consistently higher in one year for all species. Therefore, data for the two years at all VPs was aggregated, resulting in mean bird density values for the winter season and the breeding season. These average values were used

<sup>6</sup> Three flight bands were used to record flightlines during bird surveys at Derrynadarragh: 0-25m, 25-180m, and >180m

to populate daytime bird density values in the calculation excel for their corresponding months. Calculations for bird density are presented in Appendix I.

#### Proportion flying at risk height

In order to determine the proportion of birds flying at risk height the proportion of flight time recorded within each of the flight height bands is calculated using the height range of the proposed turbine model.

The risk height range of the selected turbine is 24-186m above ground. The following flight bands were used to record flightlines during VP surveys: Band A: 0-25m, Band B: 25-180m, and Band C >180m. These bands were established in advance of knowing the turbine dimensions and hence the risk height range differs slightly from Band B. In order to determine the proportion of birds within Band A and Band C that may be at height risk, a proportion of flights in each band were assigned as occurring within the flight risk height.

It is assumed that flight heights were distributed uniformly within each of the height bands that were used to record flightline data.

An upper ceiling of 400m was applied to Band C as this is likely to represent the upper height that most birds were observed. The risk height range for the proposed turbine models is 24-186m (hub height = 105m and rotor radius = 81m). For the flight height bands used, 1m of the rotor height span falls within the 0-25m band, 155m falls within the 25-180m band, and 6m falls within the 180-400m band. The flight time recorded within each flight height band for each species was expressed as a percentage of the total flight time for each species to determine the proportion of time spent within each flight height band for each species. This value was then multiplied by the proportion of the rotor height within the flight band, and this value for each flight band was summed to obtain the total proportion of flights falling within rotor risk height. The outcome of these calculations are presented in Table 6.

**Stage B Number of flights through rotors:** *Using bird density and proportion of birds at risk height (Stage A), an estimate is made of the number of bird passages through the turbine rotors over a given time period. At this stage it is assumed that birds will continue to make flights within the windfarm area at the same intensity as prior to the establishment of the windfarm.*

The potential number of flights through turbine rotors depends on turbine size. The rotor radius for turbines is 81m and nine turbines are proposed for the site. Bird flight speed is also required for this calculation. Values for each species were obtained from Alerstam *et al.* (2007).



The result of this calculation at stage B as produced by the excel spreadsheet is the projected number of rotor transits per month and per year. Projected number of transits per year are presented in Table 7.

**Stage C Probability of collision for a single transit:** *The probability of a collision during a single rotor transit by a bird is calculated.*

In this stage, the projected number of rotor transits calculated in Stage B are used to determine the single transit collision risk for each target species as presented in Table 7.

**Stage D Expected collisions per year:** *The outputs of Stage B and Stage C are multiplied to give the potential collision rate for each bird species. Current levels of bird usage at the site are still assumed at this stage, but an adjustment is made to allow for the amount of time that the turbines are operational.*

In this case a value of 85% was used as the actual percentage of operational time for the proposed windfarm site is unknown. It is known that wind turbines are not active 100% of the time and 85% is seen as an upper limit for time that a wind turbine is typically active (Wind Europe).

**Stage E Allowing for avoidance and attraction:** *This stage takes into account the proportion of birds likely to avoid the windfarm or turbines, either due to displacement, evasive action, or attraction to the windfarm site.*

For this part of the CRM analysis avoidance rates as presented in SNH (2018) were used (see Table 1). An exception however is in relation to Golden Plover, rather than applying the default 98% avoidance rate, a species specific rate of 99.8% was used. This approach is informed by a study by Gittings (2022) who reviewed data from four onshore wind farms which had confirmed avoidance rates ranging from 99.6 to 99.8.

In the case of all target bird species it was assumed that there is no reason for the proposed windfarm site to attract a higher number of species than that already present.

As the proposed windfarm comprises nine turbines, the large array correction was not applied (required for sites with 50 turbines or more).

### **Birds on Migration**

There were peak counts of Golden Plover recorded around the Autumn migration period in both years with a flock of 4,000 birds observed in Autumn 2022. It was determined that the flights did not represent migration flights but are more likely to represent staging behaviour. The migration approach was therefore not applied to the bird observations at the site.

### 3 RESULTS

A total of 13 target bird species were recorded during VP watches (Table 4).

**Table 4: Bird species recorded during VP watches at the proposed Derrynadarragh Wind Farm. Annex I refers to whether the species is listed in Annex I of the EU Birds Directive.**

| Species       | Conservation Status | Annex I |
|---------------|---------------------|---------|
| Buzzard       | Green Listed        | No      |
| Curlew        | Red Listed          | No      |
| Golden Plover | Red Listed          | Yes     |
| Hen Harrier   | Amber Listed        | Yes     |
| Kestrel       | Red Listed          | No      |
| Mallard       | Amber Listed        | No      |
| Lapwing       | Red Listed          | No      |
| Merlin        | Amber Listed        | Yes     |
| Peregrine     | Green Listed        | Yes     |
| Snipe         | Red Listed          | No      |
| Sparrowhawk   | Green Listed        | No      |
| Whooper Swan  | Amber Listed        | Yes     |
| Woodcock      | Red Listed          | No      |

The average bird density value calculated for each species recorded during VP watches is presented in Table 5 below.

The average bird density was 0 (based on rounding to four decimal places) in both seasons for Mallard, Merlin, Peregrine, and Woodcock. Therefore, these species were not included in the Collision Risk Modelling analysis.

**Table 5: Average bird density (birds / km<sup>2</sup>) of bird species recorded during VP watches at the proposed Derrynadarragh Wind Farm**

| Species       | Winter season | Breeding Season |
|---------------|---------------|-----------------|
| Buzzard       | 0.0017        | 0.0028          |
| Curlew        | 0.0000        | 0.0002          |
| Golden Plover | 6.4338        | 0.0001          |
| Hen Harrier   | 0.0001        | 0.0000          |
| Kestrel       | 0.0013        | 0.0002          |
| Lapwing       | 0.0072        | 0.0000          |
| Merlin        | 0.0000        | 0.0000          |
| Peregrine     | 0.0000        | 0.0000          |
| Snipe         | 0.0002        | 0.0000          |
| Sparrowhawk   | 0.0002        | 0.0001          |

| Species      | Winter season | Breeding Season |
|--------------|---------------|-----------------|
| Whooper Swan | 0.0002        | 0.0000          |
| Woodcock     | 0.0000        | 0.0000          |

Summary results for the calculation of proportion of birds at risk height are presented in Table 6 below (for more details see Appendix III) and were input as Proportion at risk height ( $Q_{2R}$ ) for each species in the excel spreadsheet.

**Table 6: Proportion of birds flying at risk height**

| Species       | Proportion at risk height (24-186m) |
|---------------|-------------------------------------|
| Buzzard       | 58.2%                               |
| Curlew        | 60.1%                               |
| Golden Plover | 56.2%                               |
| Hen Harrier   | 53.9%                               |
| Kestrel       | 52.9%                               |
| Lapwing       | 7.6%                                |
| Snipe         | 66.4%                               |
| Sparrowhawk   | 5.2%                                |
| Whooper Swan  | 79.8%                               |

The outcome of the collision risk modelling (number of expected collisions per year with avoidance behaviour) is presented in Table 7. All input data and calculations are presented in Appendix I-III.



**Table 7: Expected number of collisions per year (assuming avoidance behaviour) for bird species at the proposed Derrynadarragh Wind Farm**

| Species              | Projected number of rotor transits per year | Collision Risk (single transit risk) |         |         | Collision Rate    |                |                | Estimated collisions over a 30-year period |
|----------------------|---------------------------------------------|--------------------------------------|---------|---------|-------------------|----------------|----------------|--------------------------------------------|
|                      |                                             | Flapping                             | Gliding | Average | Without avoidance | Avoidance rate | With avoidance |                                            |
| <i>Buzzard</i>       | 296                                         | 6.87%                                | 6.80%   | 6.84%   | 17                | 98             | 0.3            | 9                                          |
| <i>Curlew</i>        | 22                                          | 5.53%                                | 5.47%   | 5.50%   | 1                 | 98             | 0              | 0                                          |
| <i>Golden Plover</i> | 486686                                      | 4.96%                                | NA      | 4.96%   | 20511             | 99.8           | 41             | 1230                                       |
| <i>Hen Harrier</i>   | 2                                           | 7.85%                                | 7.80%   | 7.83%   | 0.14              | 99             | 0              | 0                                          |
| <i>Kestrel</i>       | 60                                          | 6.37%                                | 6.32%   | 6.35%   | 3                 | 95             | 0.2            | 6                                          |
| <i>Lapwing</i>       | 69                                          | 5.28%                                | NA      | 5.28%   | 3                 | 98             | 0.1            | 3                                          |
| <i>Snipe</i>         | 22                                          | 4.30%                                | NA      | 4.30%   | 1                 | 98             | 0              | 0                                          |
| <i>Sparrowhawk</i>   | 1                                           | 5.80%                                |         | 5.80%   | 0.09              | 98             | 0              | 0                                          |
| <i>Whooper Swan</i>  | 1                                           | 8.82%                                | NA      | 8.82%   | 0.07              | 99.5           | 0              | 0                                          |



### 3.1 OVERVIEW OF UNCERTAINTIES

It should be noted that CRM makes the following assumptions:

- That a bird can be modelled by a simple cruciform shape
- That a turbine blade has a width and pitch, but no thickness
- That birds fly through turbines in straight lines
- That a bird's flight will be unaffected by a near miss, despite the slipstream around a turbine blade
- That no action is taken by a bird to avoid collision and so the figures represent worst case scenarios.

It is also accepted that there are uncertainties with the input data which should be considered to give an overall level of uncertainty regarding the estimated collision risk. Following Band (2024) there are five error sources within collision risk modelling:

#### 1. Uncertainty in bird density ( $e_1$ )

*Survey data shows that there are variations in bird density between surveys.*

The standard deviation of survey results has been calculated for the winter and breeding seasons. The square root of the sum of these values was then determined to allow for the fact that errors in one season may be offset by errors in the other direction in the other period. This standard deviation value was then applied to the sum of the average bird density values for the winter and breeding seasons to determine the associated percentage value and  $e$  value as presented in Table 8.

**Table 8: Uncertainty value associated with bird density for each target species.**

| Species       | $e_1$ value |
|---------------|-------------|
| Buzzard       | 0.06        |
| Curlew        | 0.02        |
| Golden Plover | 3.58        |
| Hen Harrier   | 0.01        |
| Kestrel       | 0.04        |
| Lapwing       | 0.12        |
| Snipe         | 0.02        |
| Sparrowhawk   | 0.02        |
| Whooper Swan  | 0.02        |

#### 2. Uncertainty in level of nocturnal activity ( $e_2$ )

*The actual nocturnal activity of bird species is unknown due to the absence of nighttime survey data.*



The number of daylight hours used in the calculation is assumed to be accurate. However there is uncertainty regarding nocturnal activity. It was assumed that none of the target species were active at night, with the exception of Golden Plover, Snipe, and Lapwing, which were assumed to be 25% as active at night as during the day (nocturnal activity factor = 2 in the excel spreadsheet). While it cannot be entirely ruled out due to the absence of data, it is not seen that it would be greater than 5%. Therefore the level of uncertainty for all species is  $e_2=0.05$ , with the exception of Golden Plover, Lapwing and Snipe where  $e_2=0$  (as nocturnal activity is already accounted for in the calculations for this species).

### **3. Uncertainty in proportion flying at risk height ( $e_3$ )**

*Despite bird surveyors being fully trained and very experienced, it is possible that bird flights can be recorded within the wrong flight height bands.*

In particular, it is possible that birds recorded in the 0-25m flight band may actually have been in the 25-180m flight band and vice versa. If the visual estimate was out by  $\pm 5$ m at the two lowest flight bands this would have implications for the proportion of birds flying at risk height for the proposed turbine model. The flight patterns of raptors and Whooper Swan make it unlikely that there would be errors in recording flight heights, so a low uncertainty level ( $e_3 = 0.05$ ) has been assigned to these species, with a slightly higher uncertainty level ( $e_3 = 0.1$ ) being assigned to the remaining species (Curlew, Golden Plover, Lapwing, Snipe).

### **4. Uncertainty in estimating numbers of individuals in large flocks ( $e_4$ )**

*Some species of birds often fly in large flocks, making an accurate estimation of the number of individuals present in the flock difficult.*

Golden Plover was the only species recorded in large flocks during vantage point watches with a maximum of 4,000 birds recorded in one flock. Given the large size and mobile nature of these flocks it is likely that under or overestimates regarding the number of birds were made. Lapwing was the only other bird species recorded in significant flocks (maximum of 150 birds). Given the smaller size of the flocks there is less chance of uncertainty regarding the estimate, however a small level of uncertainty does remain.

For all other target bird species an uncertainty value of  $e_4 = 0$  was assigned as these species typically occur singly or in very low numbers, eliminating the chance of making an incorrect estimate of numbers. For Lapwing, an uncertainty of 5% ( $e_4 = 0.05$ ) was assigned due to the occurrence of some smaller flocks. The very large numbers of Golden Plover increases the uncertainty of making accurate estimates of numbers, therefore an uncertainty of 20% ( $e_4 = 0.20$ ) is assigned to Golden Plover.

### **5. Uncertainty due to distance effects ( $e_5$ )**

*It has been found that higher densities of flightlines are recorded in proximity to vantage point locations, while very few flightlines are recorded in the more distant parts of viewsheds.*

Analysis of vantage point data has revealed that there are very strong distance effects on bird detection rates with very low detection rates at distances over 1km from the vantage point location. It has been suggested that correcting for under-detection due to distance could increase collision risk by a factor of 1.6 – 6.3 times (Gittings 2024). Three vantage points were used to gain comprehensive views over the proposed wind farm site, with some overlap in viewshed areas. In addition, the furthest limit of the 500m turbine buffer from each vantage point location is not greater than 1.5km, increasing the likelihood of all birds being recorded. The underestimation of bird activity at the outer limits of the viewsheds is estimated to be approximately 15% (reduced from the estimates provided by Gittings (2024)) due to the presence of three vantage points with some overlap in viewsheds and the proximity of the vantage points to the outer limits of the 500m turbine buffers. Therefore,  $e_5 = 0.15$  for all target species, with the exception of Whooper Swan and Golden Plover. The large size of Whooper Swan and the large flock size of Golden Plover reduce the chance of under recording these species, even at the outer limits of a viewshed.. Therefore the uncertainty for this species is reduced to 5% ( $e_5 = 0.05$ ) for these two species.

#### **6. Uncertainty in operational time ( $e_6$ )**

*An estimate of the operational time of the turbines is used as the actual operational time is unknown*

A value of 85% was used in the calculation as an upper limit of operational time as provided by Wind Energy Europe. Although this value is subject to some variation it is reasonably precise and so no uncertainty is assigned ( $e_6=0$  for all species).

#### **7. Uncertainty due to simplifications in the model ( $e_7$ )**

*The collision risk model involves a number of simplifications such as assuming that a bird can be modelled by a simple cruciform shape, that birds fly through turbines in straight lines, and the use of an average pitch for turbine blades.*

Following the worked example presented in Band (2024) an uncertainty of  $\pm 20\%$  is assumed ( $e_7=0.20$  for all species).

The combined uncertainty values for each target species and each proposed turbine model is presented in Table 9 below. These uncertainty values can be applied to the relevant calculated collision risk values presented in Table 10.

**Table 9: Combined uncertainty values for each target species.**

| Species | Uncertainty value |
|---------|-------------------|
| Buzzard | $\pm 0.51$ (51%)  |

| Species       | Uncertainty value |
|---------------|-------------------|
| Curlew        | $\pm 0.52$ (52%)  |
| Golden Plover | $\pm 4.13$ (413%) |
| Hen Harrier   | $\pm 0.46$ (46%)  |
| Kestrel       | $\pm 0.49$ (49%)  |
| Lapwing       | $\pm 0.62$ (62%)  |
| Snipe         | $\pm 0.47$ (47%)  |
| Sparrowhawk   | $\pm 0.47$ (47%)  |
| Whooper Swan  | $\pm 0.37$ (37%)  |

**Table 10: Estimated number of collisions per year with uncertainty values**

| Species       | Estimated number of collisions per year with avoidance and associated uncertainty values |
|---------------|------------------------------------------------------------------------------------------|
| Buzzard       | $0.3 \pm 0.15$                                                                           |
| Curlew        | $0 \pm 0$                                                                                |
| Golden Plover | $41 \pm 169^7$                                                                           |
| Hen Harrier   | $0 \pm 0$                                                                                |
| Kestrel       | $0.2 \pm 0.1$                                                                            |
| Lapwing       | $0.1 \pm 0.06$                                                                           |
| Snipe         | $0 \pm 0$                                                                                |
| Sparrowhawk   | $0 \pm 0$                                                                                |
| Whooper Swan  | $0 \pm 0$                                                                                |

---

<sup>7</sup> The uncertainty in relation to Golden Plover is mostly related to the standard deviation associated with bird densities (e1) variation due to irregular presence of large flocks and is most likely an overestimate.



## 4 REFERENCES

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

DOI:10.1371/journal.pbio.0050197

Band, W. (2024) Using a collision risk model to assess bird collision risks for onshore wind farms. NatureScot Research Report 909.

Band, W. (2012) Using a collision risk model to assess bird collision risks for offshore windfarms.

Band, W., Madders, M. and Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In: Birds and wind power: risk assessment and mitigation. M. De Lucas, G.F.E. Janss and M. Ferrer, Eds.: 259-275. Quercus, Madrid.

British Trust of Ornithology (BTO) BirdFacts. Available online at

<https://www.bto.org/understanding-birds/birdfacts>

Gittings, T. (2022). Ballivor Wind Farm: Golden Plover avoidance rates. unpublished report included as an appendix to the Ballivor Wind Farm Environmental Impact Assessment Report.

Gittings, T. (2024) Distance effects on detection rates in wind farm vantage point surveys: Implications for avian collision risk modelling. CIEEM inpractice, Issue 126 (December 2024), 40-44.

Royal Society for the Protection of Birds (RSPB) Birds and Wildlife. Available online at

<https://www.rspb.org.uk/birds-and-wildlife/>

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

Scottish Natural Heritage (2018). Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model. September 2018 v2.

Scottish Natural Heritage (2025). Wind farm impacts on birds – Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model. (Updated March 2025).

Wind Europe FAQ. Available online at <https://www.ewea.org/wind-energy-basics/faq/>



## Appendix I

### Calculating bird density for use in Stage A calculations

1. Total time in flight (bird seconds) for each target species recorded at each VP during the four surveys seasons

|               | Year 1       |       |     |             |     |     | Year 2       |         |         |             |      |     |
|---------------|--------------|-------|-----|-------------|-----|-----|--------------|---------|---------|-------------|------|-----|
|               | Winter 21/22 |       |     | Summer 2022 |     |     | Winter 22/23 |         |         | Summer 2023 |      |     |
|               | VP1          | VP2   | VP3 | VP1         | VP2 | VP3 | VP1          | VP2     | VP3     | VP1         | VP2  | VP3 |
| Kestrel       | 576          | 630   |     |             |     |     | 225          | 1664    | 155     | 159         | 456  | 17  |
| Sparrowhawk   | 86           | 23    |     | 7           |     | 141 | 151          | 158     | 27      | 13          |      | 31  |
| Buzzard       | 1588         | 1325  |     | 2441        | 14  | 159 | 518          | 318     | 96      | 1299        | 2614 | 432 |
| Curlew        |              |       |     |             |     | 264 |              |         |         |             |      |     |
| Golden Plover | 16864        | 94800 | 0   | 172         | 0   | 0   | 17480        | 1624847 | 7936621 | 0           | 0    | 0   |
| Hen Harrier   |              | 87    |     |             |     | 3   |              | 60      |         |             |      |     |
| Lapwing       | 14679        |       |     |             |     |     | 610          | 16      |         |             |      |     |
| Mallard       |              |       |     |             |     |     | 38           |         |         |             |      |     |
| Merlin        |              | 46    |     |             |     |     |              |         |         |             |      |     |
| Peregrine     |              | 41    |     |             |     |     |              |         |         |             |      |     |
| Snipe         | 91           | 44    |     |             |     |     | 427          |         |         |             | 7    | 41  |
| Whooper Swan  |              | 204   |     |             |     |     | 253          |         |         |             |      |     |
| Woodcock      |              | 15    |     |             |     |     | 7            |         |         |             |      |     |



## 2. Time in flight (total watch time divided by total watch time)

|               | Year 1       |        |     |             |        |        | Year 2       |        |         |             |        |        |
|---------------|--------------|--------|-----|-------------|--------|--------|--------------|--------|---------|-------------|--------|--------|
|               | Winter 21/22 |        |     | Summer 2022 |        |        | Winter 22/23 |        |         | Summer 2023 |        |        |
|               | VP1          | VP2    | VP3 | VP1         | VP2    | VP3    | VP1          | VP2    | VP3     | VP1         | VP2    | VP3    |
| Kestrel       | 0.0044       | 0.0049 |     | 0.0000      | 0.0000 | 0.0000 | 0.0012       | 0.0096 | 0.0010  | 0.0012      | 0.0030 | 0.0001 |
| Sparrowhawk   | 0.0007       | 0.0002 |     | 0.0001      | 0.0000 | 0.0012 | 0.0008       | 0.0009 | 0.0002  | 0.0001      | 0.0000 | 0.0002 |
| Buzzard       | 0.0123       | 0.0102 |     | 0.0205      | 0.0001 | 0.0013 | 0.0027       | 0.0018 | 0.0006  | 0.0100      | 0.0173 | 0.0029 |
| Curlew        | 0.0000       | 0.0000 |     | 0.0000      | 0.0000 | 0.0022 | 0.0000       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Golden Plover | 0.1301       | 0.7315 |     | 0.0014      | 0.0000 | 0.0000 | 0.0899       | 9.4030 | 52.4909 | 0.0000      | 0.0000 | 0.0000 |
| Hen Harrier   | 0.0000       | 0.0007 |     | 0.0000      | 0.0000 | 0.0000 | 0.0000       | 0.0003 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Lapwing       | 0.1133       | 0.0000 |     | 0.0000      | 0.0000 | 0.0000 | 0.0031       | 0.0001 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Mallard       | 0.0000       | 0.0000 |     | 0.0000      | 0.0000 | 0.0000 | 0.0002       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Merlin        | 0.0000       | 0.0004 |     | 0.0000      | 0.0000 | 0.0000 | 0.0000       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Peregrine     | 0.0000       | 0.0003 |     | 0.0000      | 0.0000 | 0.0000 | 0.0000       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Snipe         | 0.0007       | 0.0003 |     | 0.0000      | 0.0000 | 0.0000 | 0.0022       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0003 |
| Whooper Swan  | 0.0000       | 0.0016 |     | 0.0000      | 0.0000 | 0.0000 | 0.0013       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Woodcock      | 0.0000       | 0.0001 |     | 0.0000      | 0.0000 | 0.0000 | 0.0000       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |

## 3. Bird Density (time in flight divided by area)

|               | Year 1       |        |     |             |        |        | Year 2       |        |         |             |        |        |
|---------------|--------------|--------|-----|-------------|--------|--------|--------------|--------|---------|-------------|--------|--------|
|               | Winter 21/22 |        |     | Summer 2022 |        |        | Winter 22/23 |        |         | Summer 2023 |        |        |
|               | VP1          | VP2    | VP3 | VP1         | VP2    | VP3    | VP1          | VP2    | VP3     | VP1         | VP2    | VP3    |
| Kestrel       | 0.0014       | 0.0013 |     | 0.0000      | 0.0000 | 0.0000 | 0.0004       | 0.0026 | 0.0006  | 0.0004      | 0.0008 | 0.0001 |
| Sparrowhawk   | 0.0002       | 0.0000 |     | 0.0000      | 0.0000 | 0.0007 | 0.0002       | 0.0003 | 0.0001  | 0.0000      | 0.0000 | 0.0001 |
| Buzzard       | 0.0038       | 0.0028 |     | 0.0063      | 0.0000 | 0.0007 | 0.0008       | 0.0005 | 0.0004  | 0.0031      | 0.0047 | 0.0016 |
| Curlew        | 0.0000       | 0.0000 |     | 0.0000      | 0.0000 | 0.0012 | 0.0000       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Golden Plover | 0.0402       | 0.2004 |     | 0.0004      | 0.0000 | 0.0000 | 0.0278       | 2.5762 | 29.3245 | 0.0000      | 0.0000 | 0.0000 |
| Hen Harrier   | 0.0000       | 0.0002 |     | 0.0000      | 0.0000 | 0.0000 | 0.0000       | 0.0001 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Lapwing       | 0.0350       | 0.0000 |     | 0.0000      | 0.0000 | 0.0000 | 0.0010       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Mallard       | 0.0000       | 0.0000 |     | 0.0000      | 0.0000 | 0.0000 | 0.0001       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Merlin        | 0.0000       | 0.0001 |     | 0.0000      | 0.0000 | 0.0000 | 0.0000       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Peregrine     | 0.0000       | 0.0001 |     | 0.0000      | 0.0000 | 0.0000 | 0.0000       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Snipe         | 0.0002       | 0.0001 |     | 0.0000      | 0.0000 | 0.0000 | 0.0007       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0002 |
| Whooper Swan  | 0.0000       | 0.0004 |     | 0.0000      | 0.0000 | 0.0000 | 0.0004       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |
| Woodcock      | 0.0000       | 0.0000 |     | 0.0000      | 0.0000 | 0.0000 | 0.0000       | 0.0000 | 0.0000  | 0.0000      | 0.0000 | 0.0000 |

## 4. Mean bird density according to season for birds recorded during Vantage Point watches

|               | Winter season |                    | Breeding Season |                    |
|---------------|---------------|--------------------|-----------------|--------------------|
|               | Average       | Standard Deviation | Average         | Standard Deviation |
| Buzzard       | 0.0017        | 0.0015             | 0.0028          | 0.0024             |
| Curlew        | 0.0000        | 0.0000             | 0.0002          | 0.0005             |
| Kestrel       | 0.0013        | 0.0009             | 0.0002          | 0.0003             |
| Golden Plover | 6.4338        | 12.8417            | 0.0001          | 0.0002             |
| Hen Harrier   | 0.0001        | 0.0001             | 0.0000          | 0.0000             |
| Lapwing       | 0.0072        | 0.0155             | 0.0000          | 0.0000             |
| Mallard       | 0.0000        | 0.0000             | 0.0000          | 0.0000             |
| Merlin        | 0.0000        | 0.0000             | 0.0000          | 0.0000             |
| Peregrine     | 0.0000        | 0.0000             | 0.0000          | 0.0000             |
| Snipe         | 0.0002        | 0.0003             | 0.0000          | 0.0000             |
| Sparrowhawk   | 0.0002        | 0.0001             | 0.0001          | 0.0003             |
| Whooper Swan  | 0.0002        | 0.0002             | 0.0000          | 0.0000             |
| Woodcock      | 0.0000        | 0.0000             | 0.0000          | 0.0000             |



## Appendix II

### Calculations for proportion of birds flying at risk height for use in Stage A calculations

| Species       | Proportion observed 0-25m | Proportion observed 25-180m | Proportion observed 180-200m | Proportion between 24-186m (based on proportion of flight time in risk zone) |
|---------------|---------------------------|-----------------------------|------------------------------|------------------------------------------------------------------------------|
| Buzzard       | 6                         | 57                          | 37                           | $(1/25)*6\% + (155/155)*57\% + (6/220)*37\% = 58.2\%$                        |
| Curlew        | 0                         | 59                          | 41                           | $(1/25)*0\% + (155/155)*59\% + (6/220)*41\% = 60.1\%$                        |
| Golden Plover | 0                         | 55                          | 45                           | $(1/25)*0\% + (155/155)*55\% + (6/220)*45\% = 56.2\%$                        |
| Hen Harrier   | 48                        | 52                          | 0                            | $(1/25)*48\% + (155/155)*52\% + (6/220)*0\% = 53.9\%$                        |
| Kestrel       | 42                        | 51                          | 7                            | $(1/25)*42\% + (155/155)*51\% + (6/220)*7\% = 52.9\%$                        |
| Lapwing       | 0.5                       | 5                           | 94.5                         | $(1/25)*0.5\% + (155/155)*5\% + (6/220)*94.5\% = 7.6\%$                      |
| Mallard       | 0                         | 100                         | 0                            | $(1/25)*0.0\% + (155/155)*100\% + (6/220)*0\% = 100\%$                       |
| Merlin        | 83                        | 17                          | 0                            | $(1/25)*83\% + (155/155)*17\% + (6/220)*0\% = 20.3\%$                        |
| Peregrine     | 19                        | 71                          | 10                           | $(1/25)*19\% + (155/155)*71\% + (6/220)*10\% = 72\%$                         |
| Snipe         | 33                        | 65                          | 2                            | $(1/25)*33\% + (155/155)*65\% + (6/220)*2\% = 66.4\%$                        |
| Sparrowhawk   | 34                        | 2                           | 64                           | $(1/25)*34\% + (155/155)*2\% + (6/220)*64\% = 5.1\%$                         |
| Whooper Swan  | 21                        | 79                          | 0                            | $(1/25)*21\% + (155/155)*79\% + (6/220)*0\% = 79.8\%$                        |
| Woodcock      | 67                        | 33                          | 0                            | $(1/25)*67\% + (155/155)*33\% + (6/220)*0\% = 35.7\%$                        |

## Appendix III

### Collision probability

Outcome of Stage A – Stage E in collision risk model

| Species       | Projected number of rotor transits per year | Collision Risk (single transit risk) |         |         | Collision Rate    |                |                                                 | Estimated collisions over a 30-year period |
|---------------|---------------------------------------------|--------------------------------------|---------|---------|-------------------|----------------|-------------------------------------------------|--------------------------------------------|
|               |                                             | Flapping                             | Gliding | Average | Without avoidance | Avoidance rate | With avoidance and associated uncertainty value |                                            |
| Buzzard       | 296                                         | 6.87%                                | 6.80%   | 6.84%   | 17                | 98             | 0.3 ± 0.15                                      | 9 ± 4.5                                    |
| Curlew        | 22                                          | 5.53%                                | 5.47%   | 5.50%   | 1                 | 98             | 0 ± 0                                           | 0 ± 0                                      |
| Golden Plover | 486686                                      | 4.96%                                | NA      | 4.96%   | 20511             | 99.8           | 41 ± 169                                        | 1230 ± 5070 <sup>8</sup>                   |
| Hen Harrier   | 2                                           | 7.85%                                | 7.80%   | 7.83%   | 0.14              | 99             | 0 ± 0                                           | 0 ± 0                                      |
| Kestrel       | 60                                          | 6.37%                                | 6.32%   | 6.35%   | 3                 | 95             | 0.2 ± 0.1                                       | 6 ± 3                                      |
| Lapwing       | 69                                          | 5.28%                                | NA      | 5.28%   | 3                 | 98             | 0.1 ± 0.06                                      | 3 ± 1.8                                    |
| Snipe         | 22                                          | 4.30%                                | NA      | 4.30%   | 1                 | 98             | 0 ± 0                                           | 0 ± 0                                      |
| Sparrowhawk   | 1                                           | 5.80%                                |         | 5.80%   | 0.09              | 98             | 0 ± 0                                           | 0 ± 0                                      |
| Whooper Swan  | 1                                           | 8.82%                                | NA      | 8.82%   | 0.07              | 99.5           | 0 ± 0                                           | 0 ± 0                                      |

<sup>8</sup> The uncertainty in relation to Golden Plover is mostly related to the standard deviation associated with bird densities (e1) variation due to irregular presence of large flocks and is most likely an overestimate.

DRAFT









**DESIGNING AND DELIVERING  
A SUSTAINABLE FUTURE**

**[www.fehilytimoney.ie](http://www.fehilytimoney.ie)**

---

 **Cork**

 **Dublin**

 **Carlow**

