



KILLEAN PROPOSED WIND FARM: WINTERING BIRD SURVEYS 2022-23

Report to Renewable Energy Systems Ltd



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Cover photos © Steve Percival:

Top left – Greenland White-fronted Goose

Top right – Golden Eagle





KILLEAN PROPOSED WIND FARM: WINTERING BIRD SURVEYS 2022-23

INTRODUCTION

1. This report describes the wintering bird survey work carried out for a proposed wind farm at Killean, Argyll. It provides a second wintering season's baseline data on the bird populations, activity and flight paths within the vicinity of the proposed wind farm site, to inform subsequent ornithological impact assessment.
2. The surveys have been designed with reference to current NatureScot survey guidance on bird surveys for wind farms (SNH 2017). The surveys were undertaken by Tom Lowe, a highly experienced bird surveyor.

STUDY AREA

3. The site is located about 22km north from Campbeltown in Argyll. The wintering bird survey areas were chosen to include all areas within the possible zone of ornithological influence of the proposed wind farm plus a wider area to provide additional data on the ecological connectivity between the site and the Kintyre Goose Roosts SPA. This included the proposed wind farm site, plus a 500m buffer for the main winter walkover surveys (the core survey area, following NatureScot guidance, SNH 2017) and a 2km buffer for the wider wintering waterfowl surveys (the wider survey area), where access/viewing was possible and where there was potentially suitable habitat (Figure 1). The main core survey area is a mix of open moorland and conifer plantation, covering a total area of 10.9km². The wider waterfowl survey area covered an additional 9.8km², and was predominantly agriculturally-improved grassland. The site lies within the 'Argyll West and Islands' NatureScot Natural Heritage Zone (NHZ 14).

WINTERING BIRD SURVEY METHODS

4. The aim of the autumn/winter field survey work was to obtain data on the ornithological importance of the wind farm site and its surrounds at that time of year, and on the flight lines of key target species. It included walkover surveys of the site, wider area waterfowl surveys and vantage point surveys of bird flight activity. These followed the same survey methodologies used in the previous 2021-22 winter (Percival *et al.* 2022a).





Autumn/Winter Walkover Surveys

5. Walkover mapping surveys of the wintering birds within the site and a 500m buffer took place in accordance with NatureScot guidance (SNH 2017). The survey focused on key target species, which included all EU Birds Directive Annex 1 species, Wildlife & Countryside Act (1981) Schedule 1 species and Red-listed birds of Conservation Concern (Stanbury *et al.* 2021), as per NatureScot guidance (SNH 2017).
6. As well as counting and mapping each species, the behaviour of each flock was also recorded, e.g. feeding/roosting. The surveys included work at dawn and dusk to check the area specifically for roosting hen harriers and other important raptors. A total of seven surveys were undertaken at approximately monthly intervals between September 2022 and March 2023.

Waterfowl Feeding Distribution Surveys

7. Additional surveys were undertaken twice-monthly of all possible habitats that could be used by wintering waterfowl as feeding/roosting sites within up to 5km of the site (to include all of the main Tayinloan/Rhunahaorine goose feeding area, i.e. the feeding area from which geese may move to/from across the proposed wind farm site). These wider surveys gave contextual information about where goose feeding flocks were located, and provide further information the linkage to the Kintyre Goose Roosts SPA. The site lies within the potential SPA connectivity zone from this SPA (for which Greenland white-fronted geese are a qualifying feature) and within an area known to be used by the geese (SNH 2016).
8. The counts were carried out as instantaneous 'look-see' counts, recording a snapshot of the birds present in each field/count sector when it was surveyed (Gilbert *et al.* 1998). One such count of each field was made each survey day, recording the numbers of all the key species present. Any additional records made outside this time were noted as supplementary records. These snapshot counts were organised to ensure that the full range of times of day was covered in each part of the survey area.

Vantage point surveys

9. Vantage Point surveys were carried out to determine bird flight activity within the wind farm site to assess collision risk. The surveys quantified the bird numbers that could potentially be at risk of collision (including roost flight observations at dawn/dusk). All flight lines of target species were mapped, and the flight height of each flock was recorded. Target species were the same as those for the walkover surveys.
10. The specific aim of the VP surveys was to collect data on key target species flight activity to enable estimates to be made of:
 - The time spent flying over the survey area
 - The relative use made of different parts of the survey area
 - The proportion of flying time spent at different elevations above the ground.
11. Two vantage points were used to cover the potential wind farm site. The computer-generated viewsheds (using Global Mapper v21) are shown in Figure 2. For each VP, a basic 36 hours' VP surveys during the autumn/winter from each VP were carried out (as set out in NatureScot guidance), spread evenly across the winter season.
12. As the site lies within the potential SPA connectivity distance from the Kintyre Goose Roosts SPA and within a known goose roosting area (from the previous application's baseline surveys), additional VP





surveys were carried out. For each VP, the basic 36 hours VP surveys was extended to give 4.5 hours surveys per VP per visit over 13 visits (giving 58 hours in total from each of the two VPs), in line with NatureScot guidance. This extra survey effort enabled more data to be collected to cover dawn/dusk roost flights through the site (which are likely to key period of risk at this time of year). Details of survey dates, times and conditions are given in Appendix 1.

13. All key target species flights (and any other species of specific nature conservation interest) were recorded, irrespective of their distance from the vantage point. Observations were carried out throughout daylight hours but not in periods of severely reduced visibility (<3km).
14. During the VP surveys, all key target species flights were mapped and cross-referenced to a standard recording form using a numbering system, and the flight height of each was recorded. To estimate flight height as accurately as possible available reference structures (e.g. pylon lines) were used. Heights were estimated as accurately as possible and recorded as a raw estimate rather than being summarised into height classes. Below 10m estimates were made to 1m, between 10m and 20m to 2m, between 20m and 50m to 5m, and above 50m to 10m. When birds were observed over an extended period, estimates of flight height were recorded every 30 seconds. The activity during each flight was also recorded. Particular attention was paid to any observations of birds at rotor height.

WINTERING BIRD SURVEY RESULTS

Walkover Surveys

15. The bird populations found within the survey area during each of the monthly walkover surveys are summarised in Table 1. The Table shows the peak numbers recorded during each month and the overall peak counts. The peaks recorded in 2021-22 are given for comparison.

Table 1. Autumn/winter bird populations recorded in the Killean survey area during the September 2022 - March 2023 walkover surveys (monthly peak counts).

| Species | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Peak 2022-23 | PEAK 2021-22 |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|--------------|--------------|
| Whooper Swan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Pink-footed Goose | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Greenland White-fronted Goose | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Greylag Goose | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Teal | 0 | 126 | 8 | 0 | 15 | 0 | 0 | 126 | 22 |
| Mallard | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 4 |
| Tufted Duck | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Goldeneye | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 3 | 3 |
| Red Grouse | 0 | 5 | 4 | 4 | 2 | 4 | 2 | 5 | 18 |





| Species | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Peak 2022-23 | PEAK 2021-22 |
|--------------------|-----|-----|-----|-----|-----|-----|-----|--------------|--------------|
| Black Grouse | 0 | 2 | 0 | 0 | 0 | 6 | 4 | 6 | 2 |
| Little Grebe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Grey Heron | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Red Kite | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| White-tailed Eagle | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| Marsh Harrier | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Hen Harrier | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 2 | 1 |
| Sparrowhawk | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 1 |
| Buzzard | 4 | 0 | 0 | 2 | 3 | 2 | 5 | 5 | 5 |
| Golden Eagle | 4 | 1 | 2 | 0 | 4 | 0 | 0 | 4 | 1 |
| Kestrel | 2 | 2 | 2 | 1 | 1 | 2 | 0 | 2 | 0 |
| Golden Plover | 0 | 26 | 10 | 0 | 29 | 0 | 0 | 29 | 55 |
| Snipe | 0 | 3 | 2 | 0 | 0 | 2 | 0 | 3 | 7 |
| Woodcock | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 |
| Tawny Owl | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 2 | 1 |
| Common Crossbill | 3 | 13 | 10 | 4 | 28 | 16 | 16 | 28 | 2 |
| Snow Bunting | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |

Autumn/Winter Wider Area Waterfowl Survey Results

- The bird populations found within the survey area during each of the fortnightly goose distribution surveys are summarised in Table 2. The Table shows the numbers recorded during each survey and the overall peak counts. Greenland white-fronted geese were the most abundant target species and were seen frequently during the surveys from late October onwards (peak count 477 in 2022-23, compared with 575 in 2021-22).



KILLEAN WIND FARM: WINTERING BIRD SURVEYS 2022-23



| Species | 27/09/22 | 04/10/22 | 17/10/22 | 07/11/22 | 21/11/22 | 03/12/22 | 16/12/22 | 10/01/23 | 23/01/23 | 06/02/23 | 13/02/23 | 06/03/23 | 21/03/23 | Peak 2022-23 | Peak 2021-22 |
|-------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------------|--------------|
| Sparrowhawk | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Buzzard | 3 | 1 | 2 | 1 | 3 | 4 | 7 | 2 | 6 | 5 | 3 | 1 | 2 | 7 | 10 |
| Golden Eagle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Kestrel | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Peregrine | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Oystercatcher | 0 | 0 | 0 | 0 | 22 | 26 | 29 | 18 | 15 | 0 | 3 | 0 | 2 | 29 | 35 |
| Lapwing | 0 | 0 | 0 | 65 | 66 | 90 | 143 | 0 | 64 | 72 | 68 | 33 | 28 | 143 | 102 |
| Snipe | 1 | 5 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 6 |
| Woodcock | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Curlew | 3 | 1 | 11 | 32 | 115 | 36 | 16 | 34 | 4 | 2 | 5 | 0 | 3 | 115 | 90 |
| Redshank | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Mediterranean Gull | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Common Gull | 73 | 34 | 68 | 42 | 190 | 304 | 184 | 153 | 342 | 182 | 245 | 18 | 6 | 342 | 257 |
| Herring Gull | 29 | 27 | 170 | 257 | 251 | 352 | 485 | 204 | 306 | 294 | 284 | 302 | 38 | 485 | 799 |
| Great Black-backed Gull | 5 | 0 | 6 | 0 | 0 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 0 | 6 | 6 |
| Black-headed Gull | 5 | 0 | 85 | 76 | 59 | 17 | 42 | 42 | 111 | 13 | 37 | 0 | 1 | 111 | 169 |



Vantage Point Survey Results: Autumn/Winter 2022-23

17. The rates of bird flight movement observed across the survey area during the vantage point surveys in 2022-23 are summarised in Table 3. This gives the flight rate per hour recorded in each month and the total number of flights recorded. As in 2021-22, Greenland white-fronted goose was the most frequently recorded target species, with movements between feeding areas and to/from their night roosts. Lochs recorded being used for night roosts included Loch Ulagadale (adjacent to the northern edge of the core survey area), Loch Dirigadale (on the north-western edge of the core survey area), and Loch Luireach, Loch Fionn-Ghleann and Loch a' Ghlinn Bhig (all within the site).
18. There was also a small amount of whooper swan and pink-footed goose migration over the site during September-November. A range of raptor species used the site, including red kite, white-tailed eagle, hen harrier, golden eagle and merlin. Further details of key species' flights are given in Appendix 1.
19. Table 4 gives the results from the previous 2021-22 surveys for comparison. Similar levels of flight activity were recorded then too (Percival *et al.* 2022a), though several scarce raptors (particularly golden eagle and hen harrier) were recorded more frequently in 2022-23.
20. Tables 3 and 4 also give the percentage of flights of each species that were recorded at rotor height (taking rotor height as between 25m and 180m above ground level). The percentage of flights at rotor height was generally similar between the two years.

Table 3. Bird flight rates (number per hour) recorded over the Killean survey area during the September 2022 - March 2023 vantage point surveys. N = 58 hours total observation from each of the two VPs.

| Species | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Total over-flying | % at rotor height |
|-------------------------------|-------|------|------|------|------|------|------|-------------------|-------------------|
| Whooper Swan | - | 0.11 | 0.78 | - | - | - | - | 16 | 33% |
| Pink-footed Goose | 36.44 | - | - | - | - | - | - | 328 | 0% |
| Greenland White-fronted Goose | - | - | 0.39 | - | 9.67 | 9.69 | 8.25 | 501 | 100% |
| Greylag Goose | - | - | - | - | - | - | 0.40 | 8 | 100% |
| Teal | - | - | - | - | 1.00 | - | - | 18 | 0% |
| Red Grouse | - | 0.33 | 0.22 | - | 0.06 | 0.25 | 0.20 | 19 | 0% |
| Black Grouse | - | 0.11 | - | 0.06 | - | - | 0.40 | 11 | 40% |
| Grey Heron | - | 0.06 | - | - | - | - | 0.05 | 2 | 50% |
| Red Kite | - | 0.56 | - | - | - | - | - | 10 | 100% |
| White-tailed Eagle | - | - | 0.11 | - | 0.17 | 0.06 | 0.15 | 9 | 89% |
| Hen Harrier | 1.00 | 0.44 | 0.22 | 0.11 | 0.17 | - | 0.05 | 27 | 32% |
| Sparrowhawk | 0.11 | 0.17 | 0.06 | - | - | - | 0.15 | 8 | 29% |
| Buzzard | 0.22 | 0.06 | 0.22 | 0.28 | 0.44 | 0.56 | 1.10 | 51 | 55% |
| Golden Eagle | 0.56 | 0.17 | 0.78 | 0.33 | 0.61 | 0.13 | 0.75 | 56 | 93% |
| Kestrel | 0.11 | 0.28 | 0.28 | 0.22 | 0.11 | 0.19 | 0.10 | 22 | 9% |





| Species | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Total over-flying | % at rotor height |
|-------------------------|-----|------|------|------|------|------|-------|-------------------|-------------------|
| Merlin | - | 0.11 | - | - | - | - | - | 2 | 50% |
| Golden Plover | - | 1.78 | 2.56 | - | 3.22 | - | 20.45 | 545 | 91% |
| Snipe | - | 0.06 | 0.22 | - | - | 0.13 | 0.05 | 8 | 60% |
| Woodcock | - | - | 0.11 | 0.11 | 0.11 | - | 0.05 | 7 | 0% |
| Great Black-backed Gull | - | - | - | 0.06 | - | - | 0.05 | 2 | 50% |
| Tawny Owl | - | - | - | - | 0.06 | - | - | 1 | 0% |
| Long-eared Owl | - | - | 0.06 | 0.06 | - | 0.06 | - | 3 | 0% |

Table 4. Bird flight rates (number per hour) recorded over the Killean survey area during the September 2021 - March 2022 vantage point surveys. N = 58 hours total observation from each of the two VPs.

| Species | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Total over-flying | % at rotor height |
|---------------------|------|------|-------|------|------|-------|-------|-------------------|-------------------|
| Whooper Swan | - | 0.72 | 0.11 | 0.39 | - | - | - | 22 | 75% |
| Pink-footed Goose | - | 0.39 | - | - | - | - | 1.03 | 24 | 50% |
| White-fronted Goose | - | 1.06 | 26.21 | - | - | 19.17 | 10.79 | 1040 | 74% |
| Greylag Goose | - | - | - | - | - | 0.11 | 0.42 | 9 | 100% |
| Canada Goose | - | - | 0.47 | - | - | - | 0.24 | 13 | 0% |
| Teal | - | - | - | - | 0.33 | - | - | 6 | 0% |
| Red Grouse | - | 0.06 | - | - | 0.06 | - | - | 2 | 0% |
| White-tailed Eagle | - | - | - | 0.06 | 0.06 | 0.06 | 0.18 | 6 | 100% |
| Hen Harrier | - | - | 0.32 | - | 0.11 | 0.11 | 0.06 | 11 | 27% |
| Sparrowhawk | 0.22 | - | 0.05 | - | 0.06 | 0.06 | 0.06 | 6 | 40% |
| Buzzard | 0.22 | 0.50 | 0.68 | 0.22 | 0.28 | 0.17 | 0.42 | 43 | 49% |
| Golden Eagle | 0.22 | 0.06 | 0.53 | 0.06 | 0.33 | 0.28 | 0.06 | 26 | 83% |
| Kestrel | - | 0.06 | - | 0.22 | 0.06 | - | 0.06 | 7 | 14% |
| Merlin | - | 0.06 | - | - | - | - | - | 1 | 0% |
| Golden Plover | 1.44 | 2.44 | 1.74 | - | 5.22 | 0.33 | - | 190 | 70% |
| Snipe | - | - | - | - | 0.06 | - | - | 1 | 0% |
| Woodcock | - | - | 0.05 | 0.11 | 0.11 | 0.17 | 0.06 | 9 | 0% |
| Common Gull | - | - | - | - | - | - | 0.06 | 1 | 100% |
| Long-eared Owl | - | - | 0.05 | - | - | - | - | 1 | 0% |





Conservation Evaluation of Wintering Bird Populations

21. The conservation value of the wintering bird populations was determined using the criteria specified in Table 5 (from Percival 2007) and is summarised in Table 6. This includes the criteria adopted by NatureScot in the Guidelines for Selection of Biological SSSIs (Drewitt *et al.* 2020), using 1% of the resource to define international and national importance (Austin *et al.* 2023). An additional category of regional importance was assigned for species approaching the threshold for national importance and those for which the survey area held a notable concentration in a county context. A further category of ‘local importance’ was used for species that did not reach regional importance but were still of some ecological value. This included all species on the red or amber lists of the ‘Birds of Conservation Concern’ (Stanbury *et al.* 2021) that did not reach national or regional importance at the development site. National (GB) and international wintering waterfowl baseline populations have been taken from the most recently published population figures (Austin *et al.* 2023) from the national Wetland Birds Survey and other species from Woodward *et al.* (2020). Regional (Natural Heritage Zone, NHZ) populations were taken from Wilson *et al.* (2015). The site lies within the ‘Argyll West and Islands’ NatureScot Natural Heritage Zone (NHZ 14). In addition, listing on Annex 1 of the EU Birds Directive, Schedule 1 of the Wildlife and Countryside, UK BAP priority species and Scottish BAP species were all considered in the evaluation process.

Table 5. Definition of terms relating to the sensitivity of the ornithological receptors at the site.

| Conservation Value | Definition |
|--------------------|---|
| VERY HIGH | Cited interest of SPAs, SACs and SSSIs. Cited means mentioned in the citation text for the site as a species for which the site is designated (SPAs/SACs) or notified (SSSIs). |
| HIGH | Other species that contribute to the integrity of a SPA or SSSI. A local population of more than 1% of the national population of a species. EU Birds Directive Annex 1, EU Habitats Directive priority habitat/species and/or W&C Act Schedule 1 species. Ecologically sensitive species, e.g. large birds of prey or rare birds (<300 breeding pairs in the UK). |
| MEDIUM | Regionally important population of a species, either because of population size or distributional context. UK BAP priority species (if not covered above). |
| LOW | Any other species of conservation interest, e.g. species listed on the Birds of Conservation Concern not covered above. Scottish BAP species (if not covered above). |

22. The conservation value of the wintering bird populations observed in the Killean survey area during the 2021-22 and 2022-23 winter surveys has been summarised in Table 5 below. This included one very high sensitivity species (Greenland white-fronted goose – the birds seen are ecologically linked to the Kintyre Goose Roosts SPA), 11 high sensitivity species (whooper swan, barnacle goose, goldeneye, little egret, white-tailed eagle, hen harrier, golden eagle, red kite, peregrine, merlin and golden plover) that are EU Birds Directive Annex 1/Wildlife and Countryside Act Schedule 1 species, 10 medium sensitivity species (UK BAP priority/ red listed





species of conservation concern and/or species present in regionally important numbers; greylag goose, European white-fronted goose, teal, mallard, red grouse, black grouse, lapwing, curlew, herring gull and long-eared owl), and 13 low sensitivity species.

Table 6. Conservation evaluation of the wintering bird populations in the Killean survey area, September – March 2021-22 and 2022-23.

| Species | Peak (core) | Peak (wider) | >1% region | EU Birds Dir Ann 1 | W and C Act Sch 1 | Red [R]/ Amber [A] List | UK BAP priority sp | Scottish BAP sp | Conservation Value |
|-------------------------------|-------------|--------------|------------|--------------------|-------------------|-------------------------|--------------------|-----------------|--------------------|
| Mute Swan | 0 | 4 | | | | | | | Nil |
| Whooper Swan | 7 | 13 | ✓ | ✓ | ✓ | A | | ✓ | High |
| Pink-footed Goose | 328 | 1 | | | | A | | | Low |
| Greenland White-fronted Goose | 155 | 575 | ✓ | | | R | ✓ | ✓ | Very high |
| European White-fronted Goose | 0 | 1 | ✓ | | | R | ✓ | ✓ | Medium |
| Greylag Goose | 0 | 368 | ✓ | | | A | | | Medium |
| Canada Goose | 0 | 66 | | | | | | | Nil |
| Barnacle Goose | 0 | 7 | | ✓ | | A | | ✓ | High |
| Shelduck | 0 | 1 | | | | A | | | Low |
| Wigeon | 0 | 32 | | | | A | | | Low |
| Teal | 22 | 104 | ✓ | | | A | | | Medium |
| Mallard | 4 | 53 | ✓ | | | A | | | Medium |
| Tufted Duck | 1 | 0 | | | | | | | Nil |
| Goldeneye | 3 | 0 | | | ✓ | R | | | High |
| Red Grouse | 18 | 0 | | | | | ✓ | | Medium |
| Black Grouse | 2 | 0 | ✓ | | | R | ✓ | ✓ | Medium |
| Little Grebe | 1 | 0 | | | | | | | Nil |
| Little Egret | 0 | 1 | | ✓ | | | | | High |
| Grey Heron | 1 | 3 | | | | | | | Nil |
| Red Kite | 10 | 0 | ✓ | ✓ | ✓ | | | ✓ | High |
| White-tailed Eagle | 1 | 1 | ✓ | ✓ | ✓ | A | | ✓ | High |
| Marsh Harrier | 1 | 0 | ✓ | ✓ | ✓ | A | | ✓ | High |
| Hen Harrier | 1 | 1 | ✓ | ✓ | ✓ | R | | ✓ | High |
| Sparrowhawk | 1 | 1 | | | | A | | | Low |
| Buzzard | 5 | 10 | | | | | | | Nil |
| Golden Eagle | 2 | 1 | ✓ | ✓ | ✓ | | | ✓ | High |





| Species | Peak (core) | Peak (wider) | >1% region | EU Birds Dir Ann 1 | W and C Act Sch 1 | Red [R]/ Amber [A] List | UK BAP priority sp | Scottish BAP sp | Conservation Value |
|--------------------------|-------------|--------------|------------|--------------------|-------------------|-------------------------|--------------------|-----------------|--------------------|
| Kestrel | 1 | 1 | | | | A | | ✓ | Low |
| Merlin | 1 | 0 | ✓ | ✓ | ✓ | R | | ✓ | High |
| Peregrine | 0 | 1 | ✓ | ✓ | ✓ | | | ✓ | High |
| Oystercatcher | 0 | 35 | | | | A | | | Low |
| Golden Plover | 55 | 5 | | ✓ | | | | ✓ | High |
| Lapwing | 0 | 143 | | | | R | ✓ | ✓ | Medium |
| Snipe | 7 | 6 | | | | A | | | Low |
| Woodcock | 2 | 2 | | | | R | | ✓ | Low |
| Curlew | 0 | 115 | | | | R | ✓ | ✓ | Medium |
| Mediterranean Gull | 0 | 1 | ✓ | ✓ | ✓ | | | | High |
| Common Gull | 0 | 342 | | | | A | | | Low |
| Lesser Black-backed Gull | 0 | 1 | | | | A | | | Low |
| Herring Gull | 0 | 799 | ✓ | | | R | ✓ | ✓ | Medium |
| Great Black-backed Gull | 0 | 6 | | | | A | | | Low |
| Black-headed Gull | 0 | 169 | | | | A | | | Low |
| Tawny Owl | 1 | 0 | | | | A | | | Low |
| Long-eared Owl | 1 | 0 | ✓ | | | | | | Medium |

23. The key autumn/wintering bird populations recorded were as follows:

- **Greenland white-fronted goose** – the daytime feeding distribution of this species is summarised in Figure 3, which shows the peak count recorded in each count field. It was generally very similar to that recorded in the previous winter. The geese were widely distributed across the survey area, though with fewer records in the southern part (including the fields closer to the Killean site). Their flight lines (Figure 4) were mostly over the northern part of the proposed wind farm site. They roosted at night occasionally on the small lochs in the north-eastern part of the core survey area: Loch Luireach – 92 on 25/1/23, Loch Fionn-Ghleann - 64 on 7/3/23, Loch a’ Ghlinn Bhig –155 on 14/2/23.
- **Other high conservation value waterfowl:**
 - **Whooper Swan** – there were three flights recorded over the site during the 2022-23 VP surveys (Figure 5), including a flock of 7 that flew in to land on Loch a’ Ghlinn Bhig on 8/11/22. Seven further flocks of up to 12 birds were seen over-flying during the wider surveys.
 - **Barnacle Goose** – none were recorded on/over the site or in the wider survey area in 2022-23, but a small flock of up to 5 birds was seen in the previous winter (mixed with Greenland white-fronted geese in the wider survey area).





- **Goldeneye** – this species was seen occasionally on Loch na Naich within the site in small numbers (up to 2 birds), with one additional record of a bird on Loch a' Ghlinn Bhig.
- **Other wintering wildfowl** – greylag geese, teal and mallard were all recorded in the wider waterfowl survey area in regionally important numbers, but the wind farm site itself was not important for any of them, with only occasional flights recorded (Figure 5). Greylag goose distribution across the wider survey area is shown in Figure 11, and had a similar pattern to the Greenland white-fronted geese. Small numbers of migrant pink-footed geese were also recorded over-flying during the VP surveys (Figure 5).
- **Red and Black Grouse** – the distribution of these two species during the 2022-23 winter surveys is shown in Figure 6. Red grouse were widely distributed over the open moorland in the higher eastern part of the survey area. Black grouse were seen more frequently than they had been in the previous winter, in the central and western parts of the survey area.
- **Hen harrier** – this species was regularly seen hunting over the site through the winter, with 27 flights in total (see Figure 7), compared with 11 in the previous winter. No evidence was found, though, of any night roosts in the survey area, and most flights seen were below rotor height (so collision risk would be low). There were not any notable concentrations of flight activity in any particular part of the survey area, though most were seen in the central and western part of the survey area, with few in the eastern part.
- **Golden Eagle** – this species was observed more regularly over-flying the site during the VP surveys in 2022-23 than in the previous winter, with a total of 56 records (compared with 26 in 2021-22). The flight lines are shown in Figure 8. Most flights were recorded in the central and western parts of the site, mostly over the forestry. There were few flights over the flatter open moorland in the eastern part of the site (as was also found in the previous winter).
- **Other scarce raptors and owls** – white-tailed eagle, red kite, marsh harrier, merlin and long-eared owl were all recorded during the winter surveys, but only infrequently in low numbers (Figure 9). There was no indication that the survey area was important to any of these species at this time of year.
- **Golden Plover** – small numbers (peak 55 in 2021-22 and 29 in 2022-23) of golden plover were seen regularly through the winter using the site during the walkover and VP surveys. Most birds in both winters were seen on the flatter open moorland in the eastern part of the survey area (Figure 10).





Killean Wind Farm: Winter Bird Surveys 2022-23

FIGURE 1

Winter Survey Areas

- KEY:**
- Wider waterfowl survey area
 - Winter walkover survey area
 - Kintyre Goose Roosts SPA (part)
 - Indicative turbines



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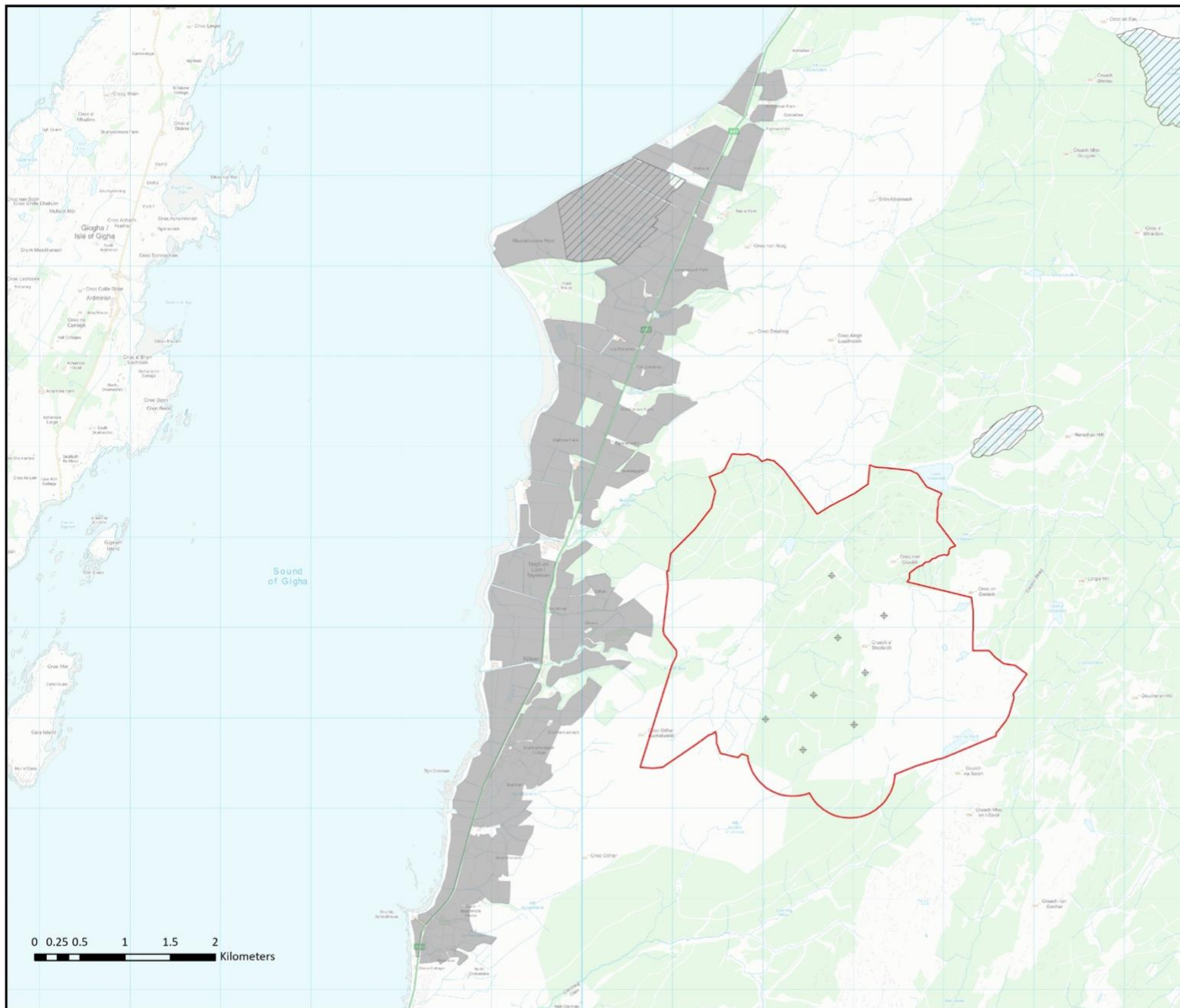
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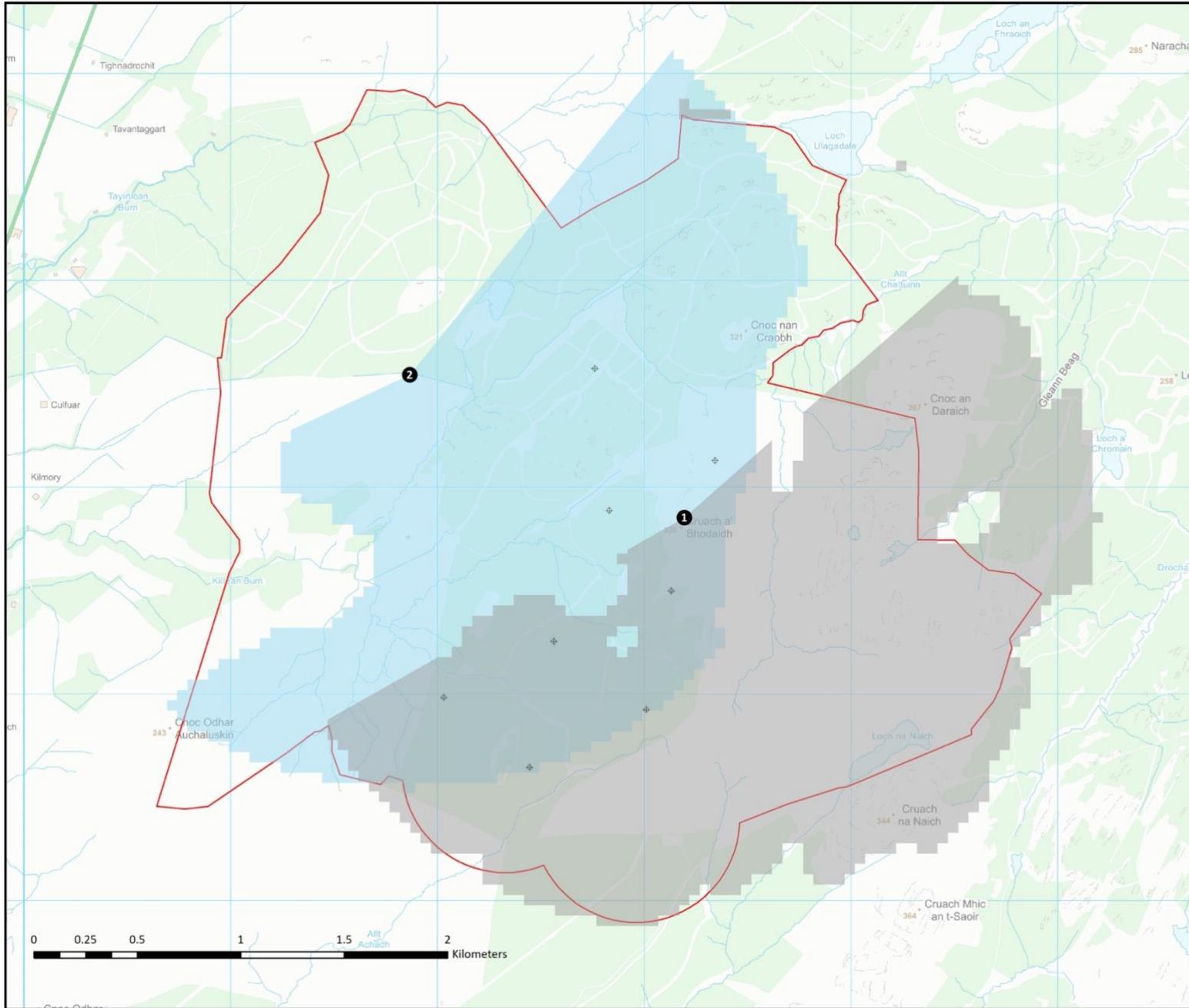
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**WINTERING BIRDS
2022-23**

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**Killan Wind Farm: Winter
Bird Surveys 2022-23**

FIGURE 2

**VP Locations and
Viewsheds**

KEY:

- VP locations
- VP1 viewshed
- VP2 viewshed
- ▭ Winter walkover area
- ⊕ Indicative turbines



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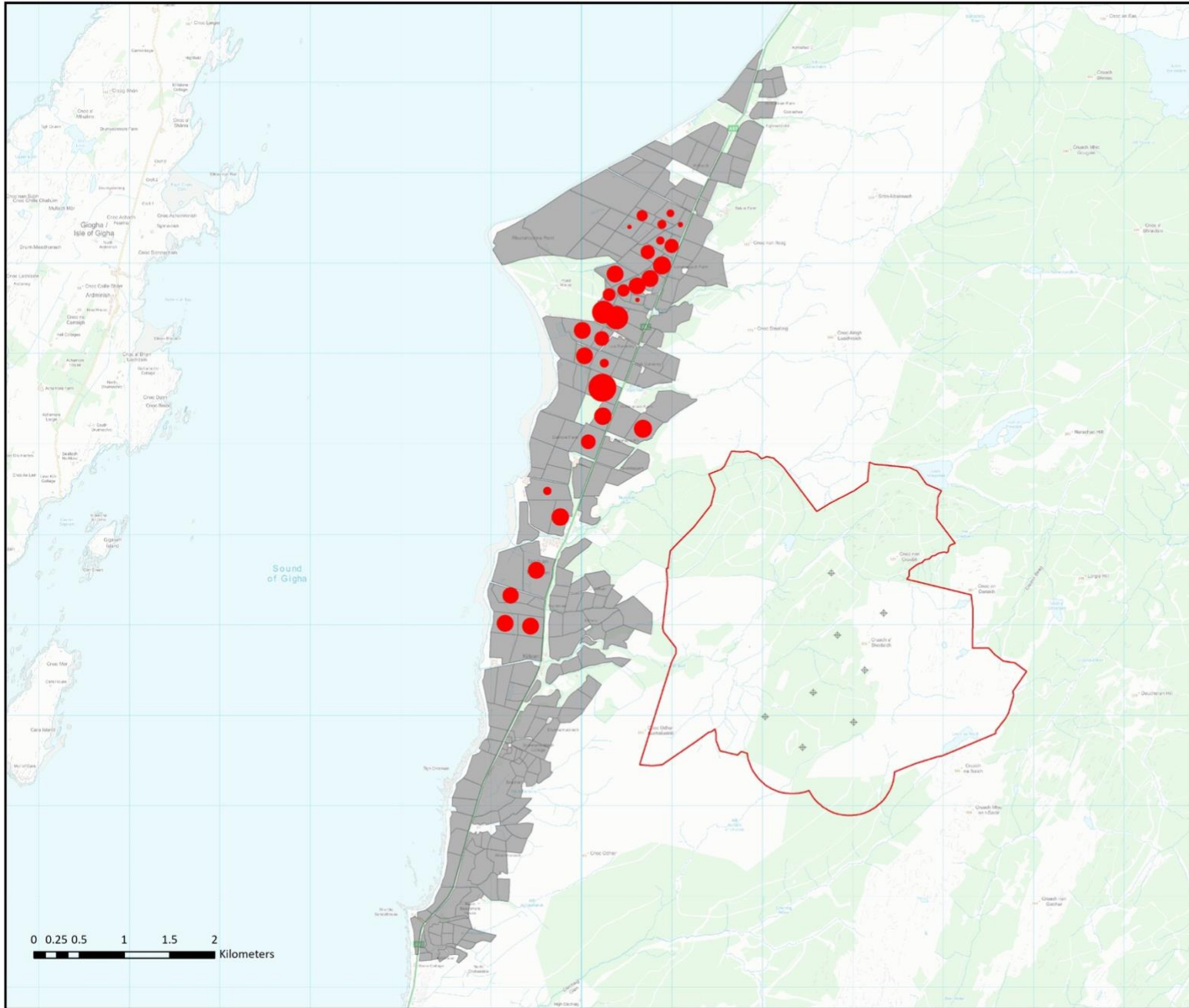
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SCALE - 1:17,500 @ A3

**WINTERING BIRDS
2022-23**

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Killean Wind Farm: Winter Bird Surveys 2022-23

FIGURE 3

Wider Field Peak Counts: Greenland White-fronted Goose

- KEY:**
- 10
 - 50
 - 100
 - Wider waterfowl survey area
 - Winter walkover survey area
 - ⊕ Indicative turbines



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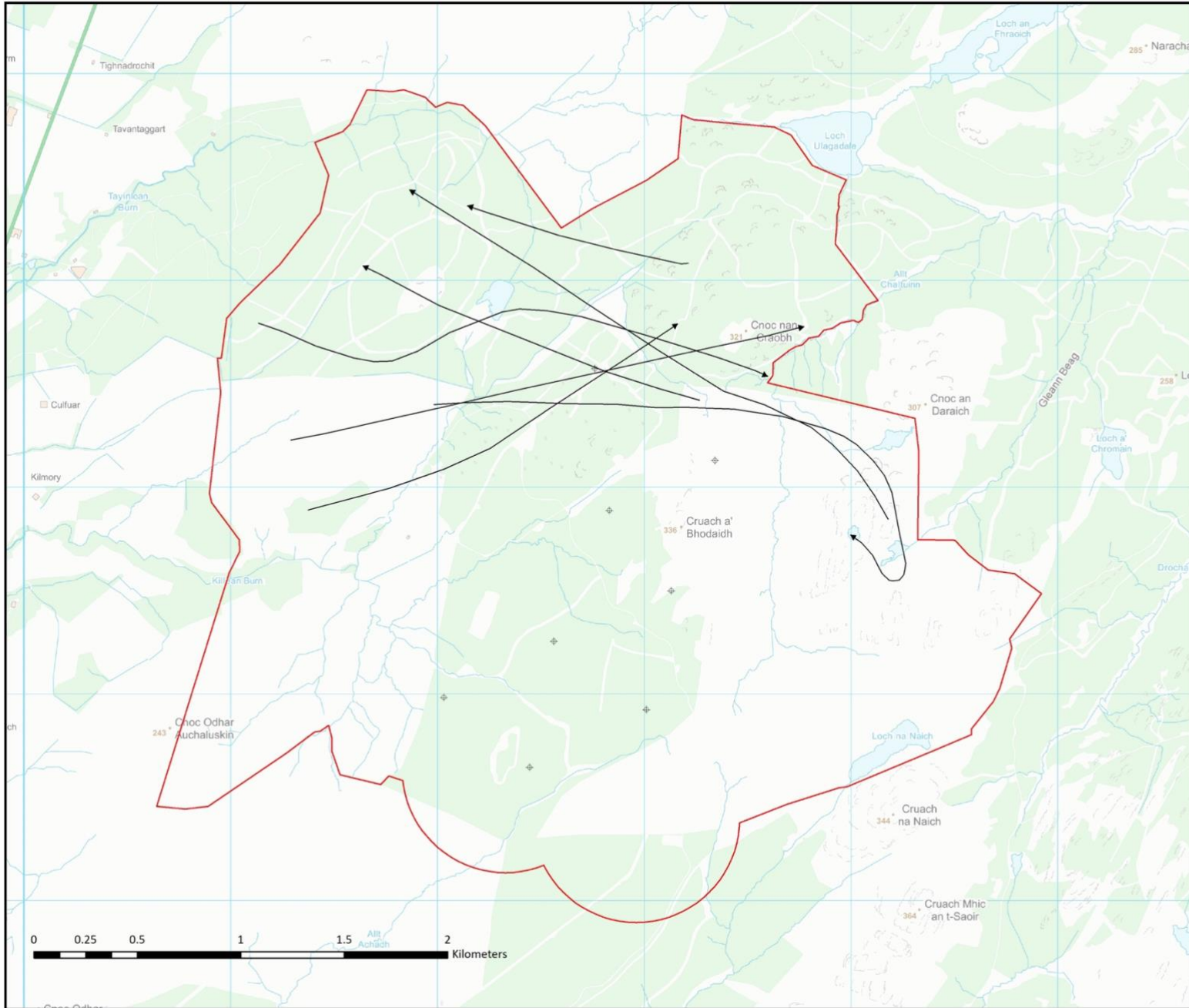
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**Killalea Wind Farm: Winter
Bird Surveys 2022-23**

FIGURE 4

**VP Survey Flight Lines:
Greenland White-
fronted Goose**

KEY:

- ⊕ Indicative turbines
- Flight lines 22-23
- Winter walkover survey area



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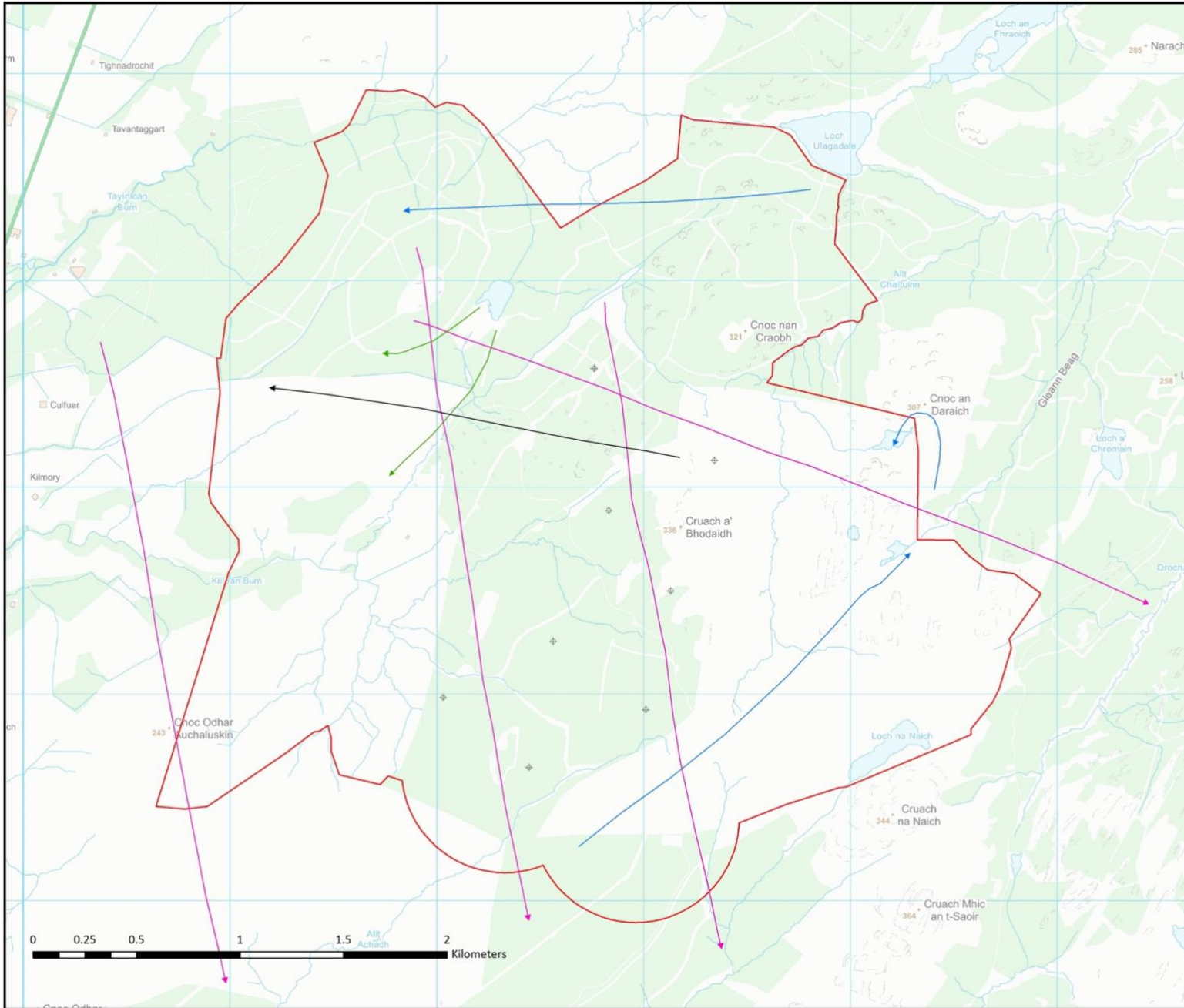
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2022-23**

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**Killean Wind Farm: Winter
Bird Surveys 2022-23**

FIGURE 5

**VP Survey Flight Lines:
other waterfowl species**

KEY:

Flight lines:

- Greylag Goose
- Pink-footed Goose
- Teal
- Whooper Swan
- Winter walkover survey area
- ⊕ Indicative turbines



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LASTEST DATE: N/A DRAWING NO.: N/A

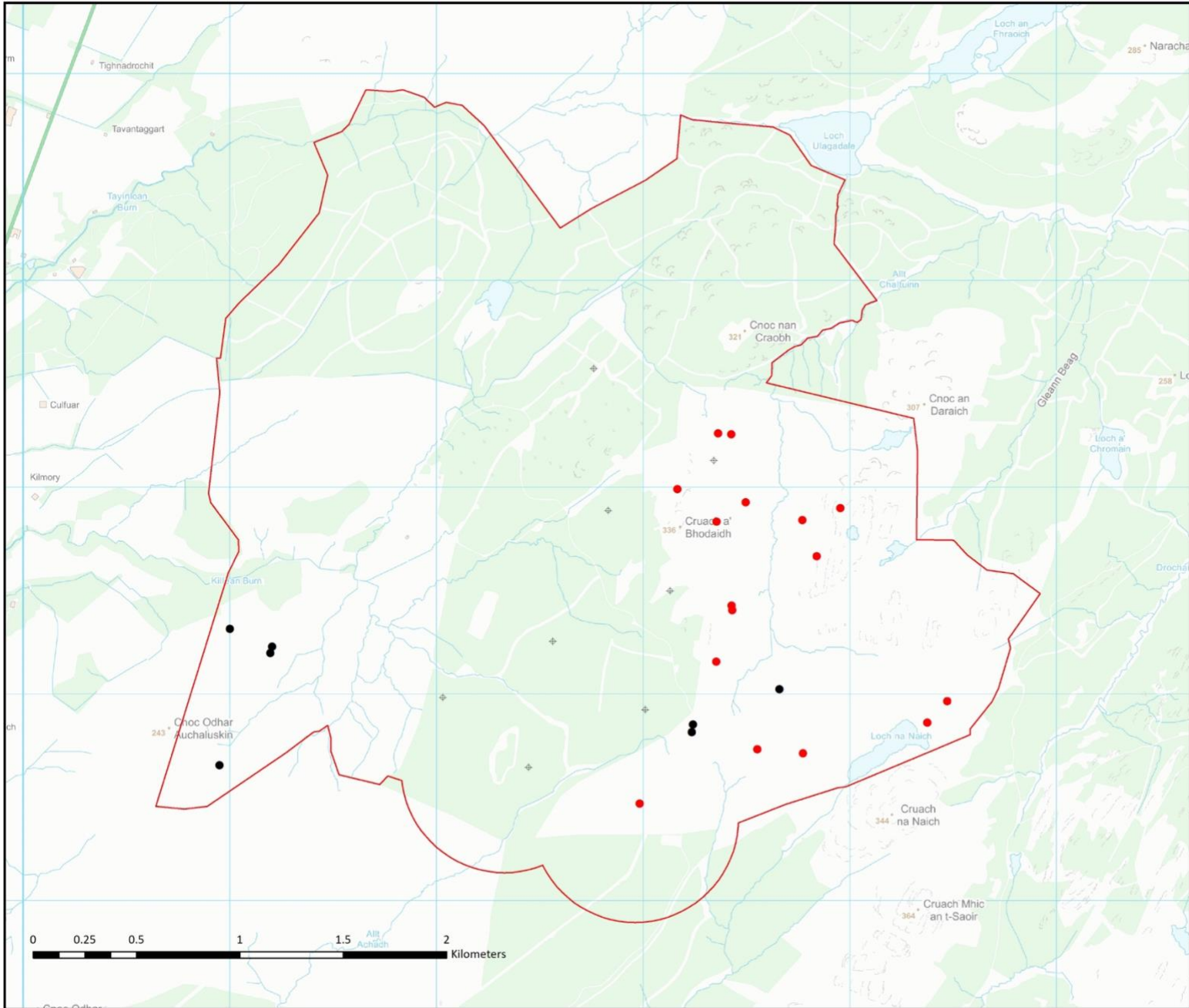
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**Kilean Wind Farm: Winter
Bird Surveys 2022-23**

FIGURE 6

**Walkover Survey:
Red Grouse and
Black Grouse**

KEY:

Species

- Black Grouse
- Red Grouse
- Winter walkover survey area
- ⊕ Indicative turbines



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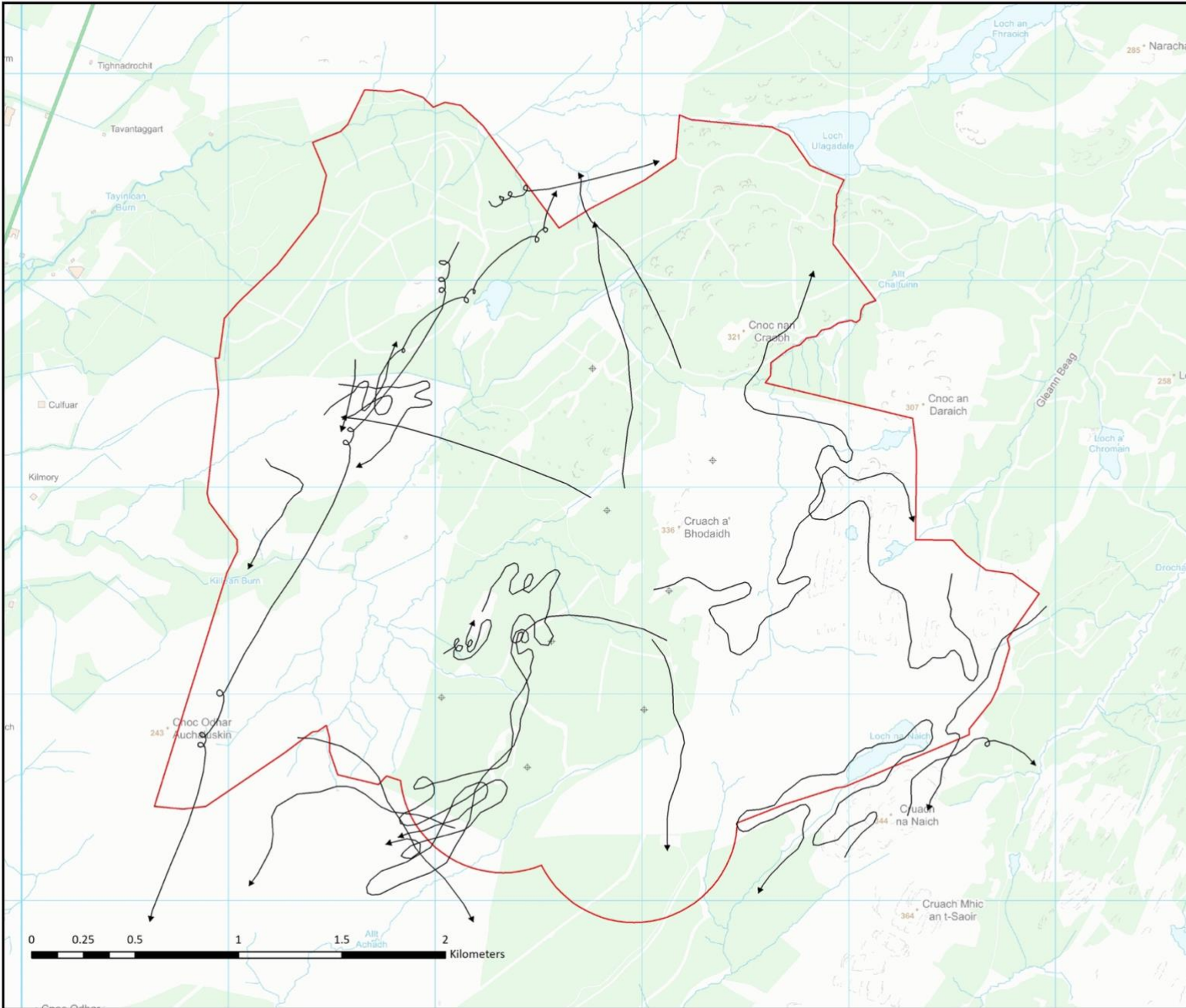
LAYOUT NO. N/A DRAWING NO. N/A

PROJECT NUMBER
KL2023-1

SCALE - 1:17,500 @ A3

**WINTERING BIRDS
2022-23**

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**Killeen Wind Farm: Winter
Bird Surveys 2022-23**

FIGURE 7

**VP Survey Flight Lines:
Hen Harrier**

- KEY:**
- ⊕ Indicative turbines
 - Flight lines 22-23
 - Winter walkover survey area



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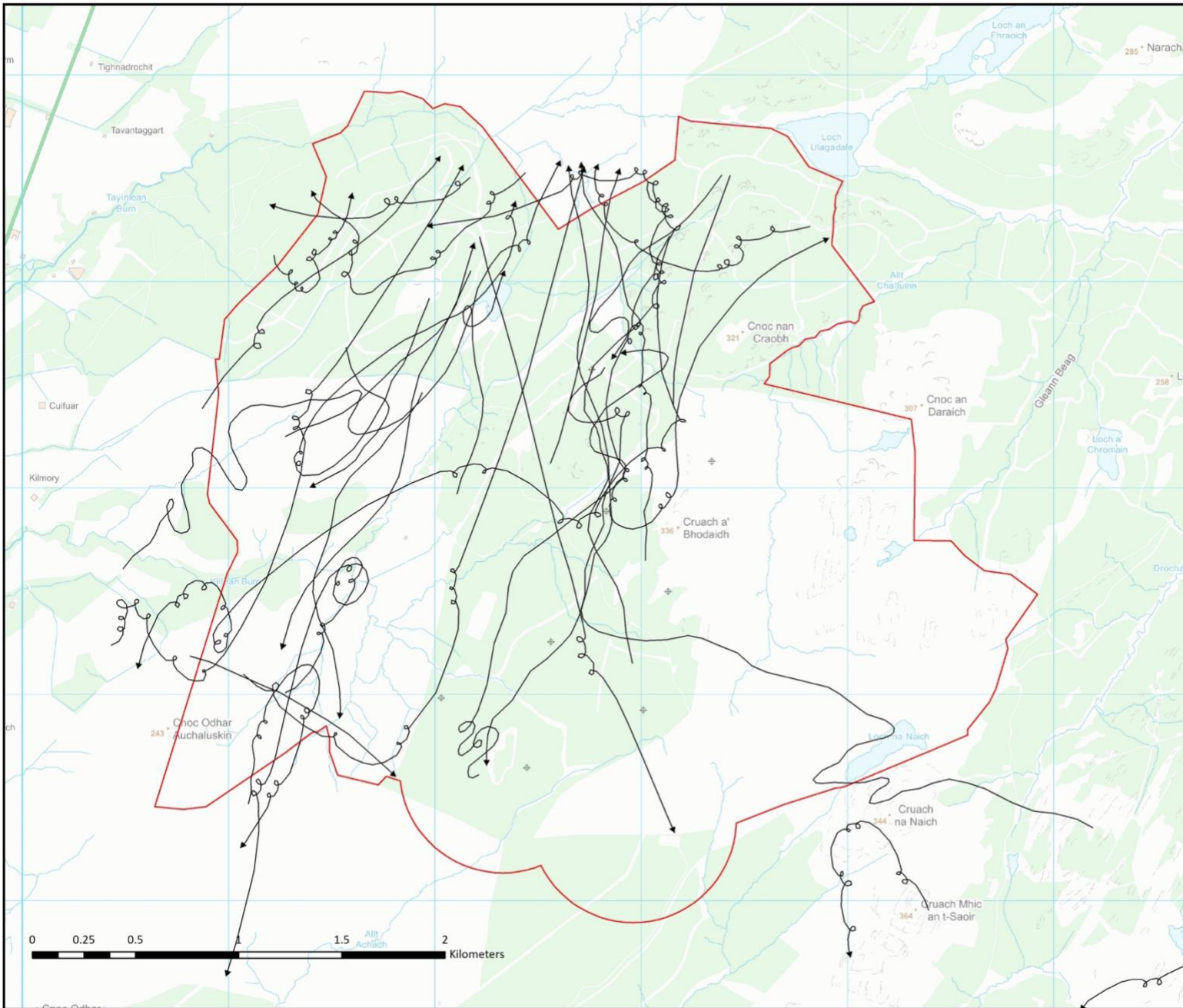
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PROJECT CODE: KL2023-1

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**WINTERING BIRDS
2022-23**

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Killalea Wind Farm: Winter Bird Surveys 2022-23

FIGURE 8

VP Survey Flight Lines: Golden Eagle

- KEY:**
- ⊕ Indicative turbines
 - Flight lines 22-23
 - Winter walkover survey area



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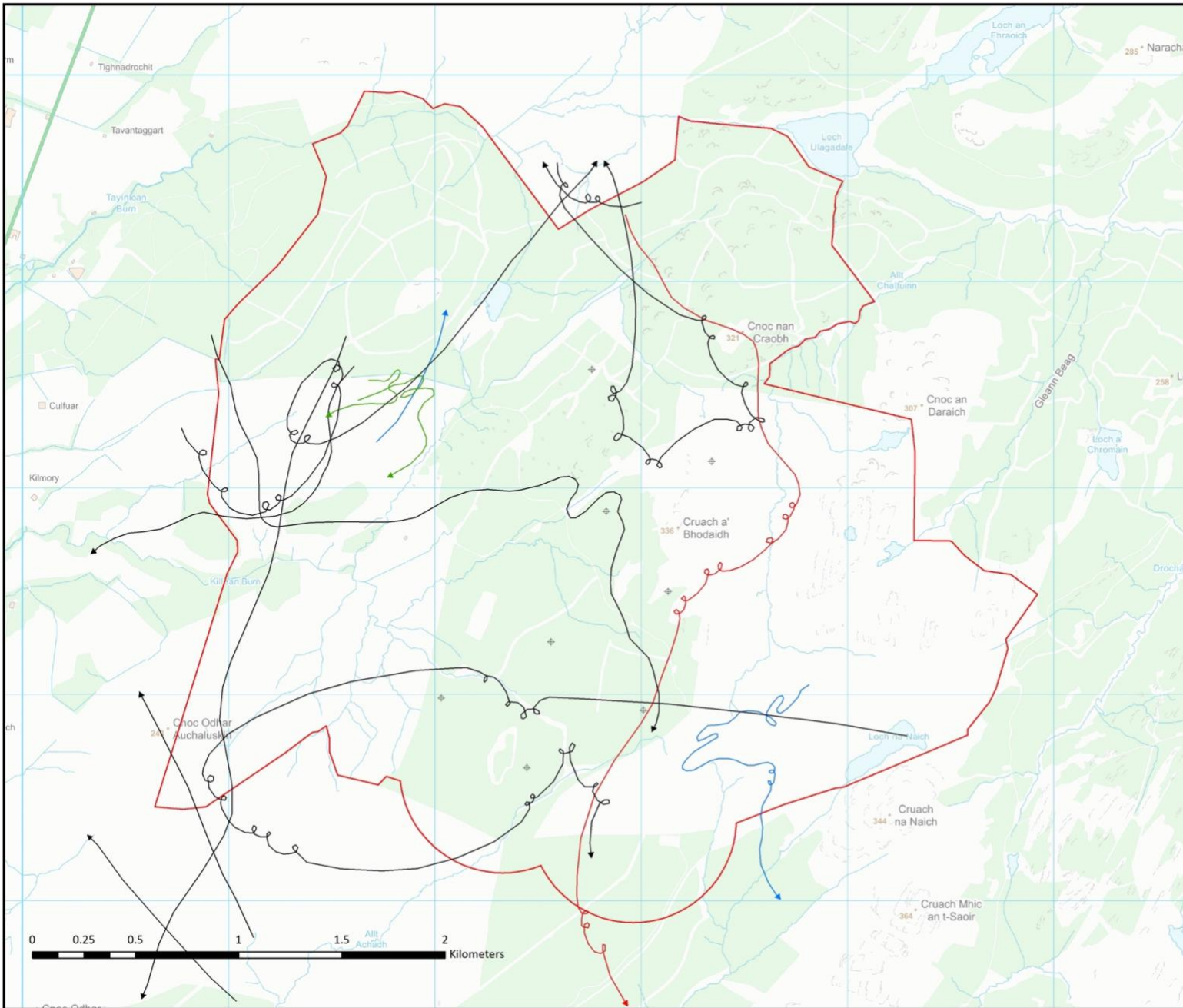
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PROJECT NUMBER: KL2023-1

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2022-23**

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Killalea Wind Farm: Winter Bird Surveys 2022-23

FIGURE 9

VP Survey Flight Lines: Other key raptors

- KEY:**
- ⊕ Indicative turbines
 - White-tailed Eagle
 - Merlin
 - Long-eared Owl
 - Red Kite
 - Winter walkover survey area



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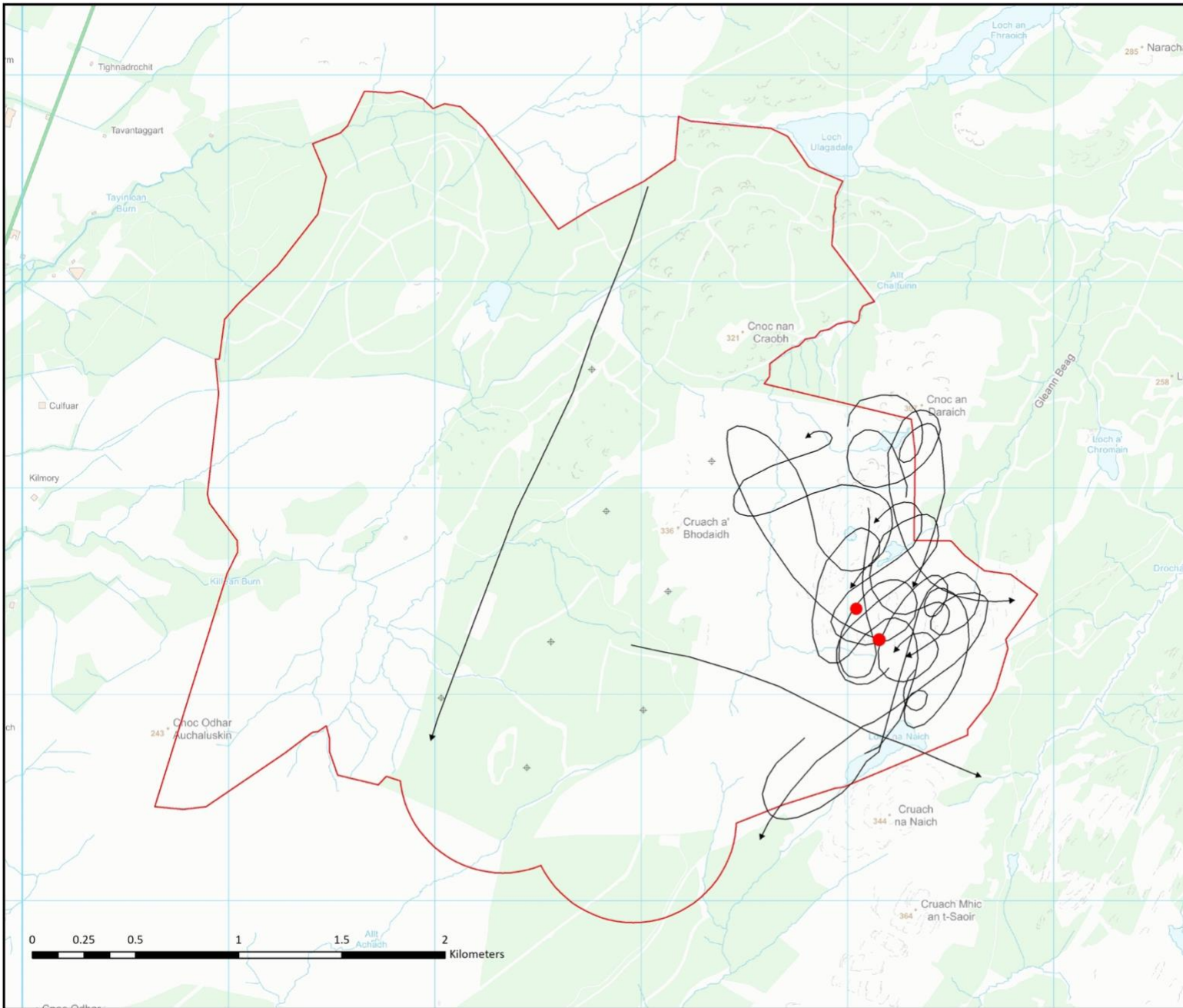
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Killlean Wind Farm: Winter Bird Surveys 2022-23

FIGURE 10

VP Survey Flight Lines and Walkover Records: Golden Plover

- KEY:**
- Flock**
 - 30
 - Flight lines 22-23
 - Winter walkover survey area
 - ⊕ Indicative turbines



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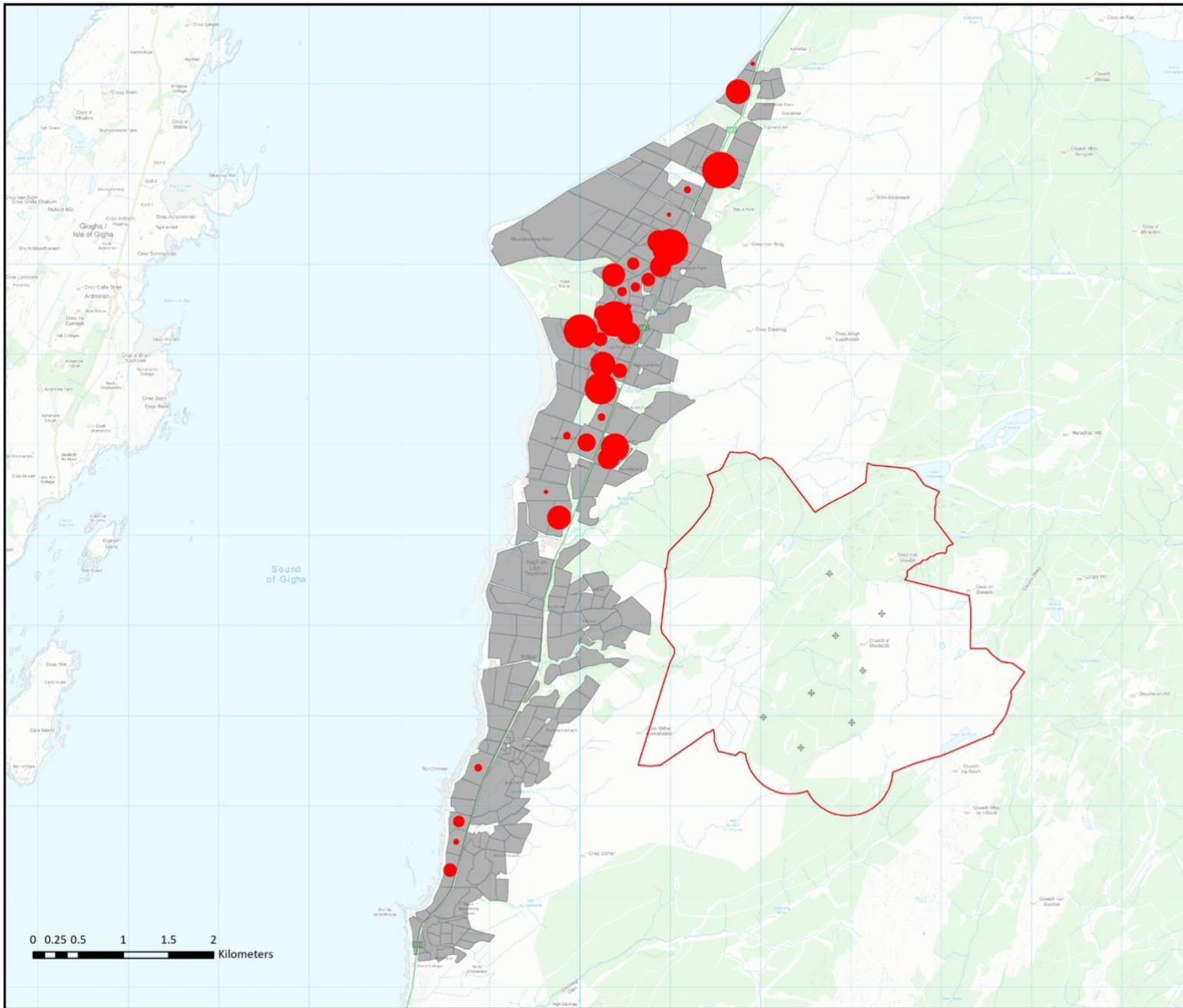
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WINTERING BIRDS 2022-23

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Killeen Wind Farm: Winter Bird Surveys 2022-23

FIGURE 11

Wider Field Peak Counts: Greylag Goose

- KEY:**
- Field peak counts 22-23
 - 1
 - 10
 - 100
 - Wider waterfowl survey area
 - Winter walkover survey area
 - Indicative turbines



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**WINTERING BIRDS
2022-23**

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CONCLUSIONS

24. The 2022-23 wintering bird surveys found a range of wintering bird populations of conservation importance using the survey area, very similar to those recorded in the previous winter. The highest conservation importance was the wintering Greenland white-fronted goose population, for which there was a clear ecological link between the site and the Kintyre Goose Roosts SPA. The wind farm ornithological assessment will require Habitats Regulations Assessment (including Appropriate Assessment). As the proposed wind farm site is not itself within an important goose feeding area, the main potential impacts of on this species would be (a) collision risk, which will require modelling to determine the magnitude of this risk, and (b) potential disturbance to roosting birds at night (especially during construction of the wind farm). Avoidance of the main goose flight routes would reduce collision risk to this species – collision risk modelling will help define the extent of this avoidance zone more precisely. The northernmost turbine of the current layout lies closer to that main flight corridor, so will have a higher collision risk (but the magnitude of this risk will need to be determined by collision risk modelling).
25. Other wintering waterfowl of importance included whooper swan, barnacle goose, and goldeneye, though the overall numbers of these species were low, and therefore unlikely to result in significant collision risk (though this will need to be confirmed with collision risk modelling) or other impacts. The wider waterfowl survey area supported a range of regionally important waterfowl populations, including greylag goose, teal, and mallard, but give the separation from the proposed wind farm site these would not be likely to be significantly affected by it.
26. Red and black grouse were both resident within the survey area. Design mitigation may be needed for black grouse but that will be informed by the results of the 2022 breeding bird surveys and the surveys that are being carried out during the 2023 breeding season.
27. Hen harrier and golden eagle were seen regularly hunting over the survey area, though no areas of particular importance were identified for either species. Collision risk modelling will help inform the impacts of the proposed wind farm on these species, but no specific spatial constraints for them have been identified.
28. Other raptor species, including white-tailed eagle, red kite, marsh harrier, merlin and long-eared owl, were recorded in lower numbers and less frequently, so no design or other mitigation would be likely to be required for them at this stage.
29. Golden plover were recorded regularly using the site through the winter (primarily the open moorland in the eastern part of the site) but only in small numbers, so no design or other mitigation would be likely to be required for them at this stage.

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APPENDIX 1. VANTAGE POINT SURVEY DATA

Survey Information

| Date | Vantage Point No | Start time | Finish time | Weather |
|------------|------------------|------------|-------------|--|
| 14/09/2022 | 1 | 13:10 | 14:40 | cloud 4/8, wind NW 3, 13C, vis very good (cloud base lifted off hill at 12:30) |
| 14/09/2022 | 2 | 18:00 | 20:00 | cloud 5/8, wind NW 3, 13C, vis very good |
| 26/09/2022 | 1 | 17:00 | 20:00 | cloud 5/8, wind NW 4, 9C, vis excellent, few showers |
| 27/09/2022 | 2 | 15:00 | 16:00 | cloud 7/8, wind NW 4, 11C, vis excellent |
| 28/09/2022 | 2 | 06:30 | 08:00 | cloud 1/8, wind N 2, 3C, vis very good |
| 04/10/2022 | 2 | 14:10 | 15:40 | cloud 8/8, wind W 2, 13C, vis very good |
| 04/10/2022 | 2 | 16:45 | 19:45 | cloud 8/8, wind W 3, 13C, vis very good |
| 05/10/2022 | 1 | 08:05 | 09:35 | cloud 8/8, wind WSW 3, 11C, vis very good |
| 05/10/2022 | 1 | 10:05 | 13:05 | cloud 8/8, wind WSW 4, 10C, vis very good, showers |
| 18/10/2022 | 2 | 06:55 | 09:55 | cloud 4/8, wind 0, 6C, vis very good, mist in valleys |
| 18/10/2022 | 2 | 12:05 | 13:35 | cloud 4/8, wind E 3, 12C, vis very good |
| 18/10/2022 | 1 | 14:05 | 17:05 | cloud 7/8, wind E 2, 11C, vis very good |
| 18/10/2022 | 1 | 17:35 | 19:05 | cloud 1/8, wind ENE 4, 10C, vis very good |
| 08/11/2022 | 1 | 06:50 | 08:50 | cloud 4/8, wind S 3, 7C, vis very good |
| 08/11/2022 | 1 | 09:20 | 11:50 | cloud 8/8, wind S 3, 9C, vis very good, rain |
| 08/11/2022 | 2 | 12:20 | 14:20 | cloud 3/8, wind S 4, 9C, vis excellent |
| 08/11/2022 | 2 | 14:50 | 17:20 | cloud 6/8, wind S 3, 9C, vis excellent |
| 22/11/2022 | 2 | 07:10 | 08:40 | cloud 2/8, wind NE 3, 6C, vis very good |
| 22/11/2022 | 2 | 09:10 | 11:10 | cloud 1/8, wind NE 2, 6C, vis very good |
| 22/11/2022 | 1 | 12:00 | 15:00 | cloud 2/8, wind 0, 6C, vis very good |
| 22/11/2022 | 1 | 15:30 | 17:00 | cloud 5/8, wind SSE 1, 6C, vis very good |
| 24/11/2022 | 2 | 14:40 | 15:40 | cloud 1/8, wind S 4, 7C, vis very good |
| 03/12/2022 | 2 | 14:00 | 17:00 | cloud 8/8, wind SE 3, 6C, vis excellent |
| 04/12/2022 | 1 | 07:30 | 10:30 | cloud 3/8, wind ENE 4, 3C, vis very good |
| 04/12/2022 | 1 | 11:00 | 12:30 | cloud 7/8, wind ENE 4, 5C, vis very good |
| 04/12/2022 | 2 | 13:00 | 14:30 | cloud 4/8, wind ENE 4, 5C, vis very good |
| 15/12/2022 | 1 | 11:50 | 14:50 | cloud 3/8, wind N 2, 0C, vis excellent |
| 15/12/2022 | 1 | 12:20 | 14:50 | cloud 3/8, wind N 2, 0C, vis excellent |
| 15/12/2022 | 1 | 15:20 | 16:50 | cloud 2/8, wind N 2, 0C, vis excellent |
| 16/12/2022 | 2 | 07:45 | 09:45 | cloud 8/8, wind SW 3, 3C, vis very good, rain until 08:00 |
| 16/12/2022 | 2 | 10:15 | 12:45 | cloud 8/8, wind SW 4, 4C, vis very good |
| 09/01/2023 | 2 | 12:10 | 15:10 | cloud 8/8, wind WSW 4, 5C, vis good, rain/hail shower |
| 09/01/2023 | 2 | 15:40 | 17:10 | cloud 7/8, wind W 3, 5C, vis very good |
| 12/01/2023 | 1 | 07:45 | 10:15 | cloud 8/8, wind S 3, 5C, vis good, mist 08:00 - 08:15 |
| 12/01/2023 | 1 | 10:45 | 12:45 | cloud 4/8, wind SW 4, 5C, vis very good |
| 24/01/2023 | 2 | 07:30 | 10:00 | cloud 8/8, wind SSW 1, 8C, vis good |
| 24/01/2023 | 2 | 11:40 | 13:40 | cloud 8/8, wind SSW 1, 9C, vis good |
| 25/01/2023 | 1 | 12:30 | 14:30 | cloud 2/8, wind 3, 8C, vis excellent |
| 25/01/2023 | 1 | 15:00 | 17:30 | cloud 7/8, wind NW 4, 7C, vis excellent, brief shower |
| 06/02/2023 | 2 | 12:35 | 15:05 | cloud 8/8, wind SSW 3, 7C, vis excellent |
| 06/02/2023 | 2 | 15:35 | 18:05 | cloud 8/8, wind S 3, 7C, vis excellent |
| 07/02/2023 | 1 | 07:05 | 09:05 | cloud 8/8, wind SSW 2, 7C, vis very good |
| 07/02/2023 | 1 | 09:35 | 10:35 | cloud 8/8, wind WNW 2, 7C, vis very good |
| 08/02/2023 | 1 | 16:05 | 17:35 | cloud 8/8, wind SSW 4, 7C, vis very good |
| 14/02/2023 | 2 | 06:55 | 07:55 | cloud 7/8, wind SSE 4, 7C, vis very good |
| 14/02/2023 | 2 | 09:30 | 12:30 | cloud 8/8, wind SSE 4, 7C, vis good, cloud base on VP1 |
| 14/02/2023 | 1 | 13:05 | 14:05 | cloud 8/8, wind SSE 4, 7C, vis good |
| 14/02/2023 | 1 | 16:30 | 18:00 | cloud 8/8, wind SSE 4, 7C, vis good, cloud suddenly lifted |
| 06/03/2023 | 2 | 17:05 | 19:05 | cloud 6/8, wind NNW 3, 6C, vis very good |
| 07/03/2023 | 1 | 06:00 | 09:00 | cloud 0, wind N!, -4C, vis excellent, visible lochs frozen |
| 07/03/2023 | 1 | 09:30 | 12:30 | cloud 0, wind N 1, 2C, vis excellent |
| 07/03/2023 | 2 | 13:05 | 15:35 | cloud 4/8, wind NNW 3, 4C, vis very good |
| 22/03/2023 | 2 | 05:20 | 07:50 | cloud 1/8, wind SW 5, 6C, vis excellent |
| 22/03/2023 | 2 | 08:20 | 10:20 | cloud 0, wind SW 5, 7C, vis excellent |
| 22/03/2023 | 1 | 14:00 | 16:00 | cloud 2/8, wind SSW 4, 10C, vis very good |
| 22/03/2023 | 1 | 16:30 | 19:30 | cloud 7/8, wind SSW 3, 10C, vis very good |



Key Species Data

| VP | Date | Time | Species | Count | Direction | Flight height (m) | Activity | Time observed (s) | Notes |
|----|----------|-------|---------|-------|-----------|-------------------|---------------|-------------------|---|
| 2 | 14/09/22 | 18:00 | EA | 2 | NNE | 80 | hunt/soar | 620 | ad pair |
| 2 | 14/09/22 | 18:34 | HH | 2 | SSW | 18 | hunt/roost | 30 | male and juv |
| 2 | 14/09/22 | 18:43 | HH | 3 | circle | 5 | hunt/chase | 480 | 3 grey males chasing around over clearfell, mobbing K and then landed on edge of heather clearing |
| 2 | 14/09/22 | 19:20 | HH | 2 | NNE | 30 | hunt/chase/rc | 1320 | same as 4, chasing each other, chasing HC, eventually dropped into marsh |
| 2 | 14/09/22 | 19:30 | HH | 1 | WNW | 30 | hunt/roost | 720 | juv, joined 6 chasing, then dropped into marsh |
| 2 | 14/09/22 | 19:38 | HH | 1 | NNE | 25 | hunt/roost | 170 | male, same as 4, the 3rd male |
| 1 | 26/09/22 | 18:09 | PG | 37 | SSE | 400 | migrating | 120 | |
| 1 | 26/09/22 | 18:23 | EA | 2 | SE | 35 | soar | 500 | ad pair |
| 1 | 26/09/22 | 18:28 | PG | 155 | SSE | 500 | migrating | 120 | |
| 1 | 26/09/22 | 18:54 | PG | 54 | ESE | 700 | migrating | 100 | |
| 1 | 26/09/22 | 19:18 | PG | 82 | SSE | 500 | migrating | 120 | |
| 2 | 27/09/22 | 15:10 | EA | 1 | NNW | 104 | hunt | 440 | ad male |
| 2 | 04/10/22 | 14:28 | EA | 1 | SW | 29 | hunt | 130 | ad male, landed in tree |
| 2 | 04/10/22 | 14:33 | BK | 1 | WSW | 33 | | 80 | male |
| 2 | 04/10/22 | 14:43 | HH | 1 | ESE | 5 | hunt | 140 | male |
| 2 | 04/10/22 | 15:00 | EA | 1 | SW | 45 | hunt | 310 | ad male, same as 1, landed in tree |
| 2 | 04/10/22 | 15:14 | EA | 1 | NNE | 33 | hunt | 500 | ad male, same as 4, landed in tree |
| 2 | 04/10/22 | 17:00 | ML | 1 | NNE | 20 | hunt | 45 | juv |
| 2 | 04/10/22 | 17:48 | HH | 1 | WNW | 3 | hunt | 120 | male |
| 2 | 04/10/22 | 18:31 | BK | 1 | SSW | 25 | | 50 | male, same as 2 |
| 1 | 05/10/22 | 11:00 | GP | 21 | S | 40 | | 350 | landed |
| 2 | 18/10/22 | 08:10 | WS | 2 | WSW | 150 | migrating | 120 | |
| 2 | 18/10/22 | 13:33 | HH | 1 | WNW | 33 | hunt | 90 | male |
| 1 | 18/10/22 | 14:36 | HH | 1 | SW | 7 | hunt | 80 | male |
| 1 | 18/10/22 | 15:22 | KT | 10 | SE | 108 | migrating | 470 | |
| 1 | 18/10/22 | 16:30 | ML | 1 | SW | 25 | hunt | 240 | female |
| 1 | 18/10/22 | 16:31 | HH | 1 | NE | 5 | hunt | 360 | male, prob same as 8 |
| 1 | 18/10/22 | 16:40 | HH | 1 | SSE | 5 | hunt | 960 | second male |
| 1 | 18/10/22 | 16:45 | HH | 1 | ENE | 11 | hunt | 720 | third male |
| 1 | 18/10/22 | 16:56 | GP | 10 | N | 40 | flushed | 70 | |
| 1 | 18/10/22 | 16:59 | HH | 1 | NNE | 8 | hunt | 70 | female |
| 1 | 18/10/22 | 18:02 | GP | 1 | ESE | 50 | | 90 | |
| 1 | 08/11/22 | 07:23 | EA | 1 | WSW | 40 | hunt | 130 | ad male |
| 1 | 08/11/22 | 07:41 | WS | 7 | NE | 10 | roost | 110 | family group, landed out of sight |
| 1 | 08/11/22 | 08:49 | WE | 1 | NW | 30 | hunt | 50 | |
| 1 | 08/11/22 | 09:59 | GP | 26 | SW | 65 | | 450 | |
| 1 | 08/11/22 | 10:15 | EA | 1 | SW | 43 | hunt | 170 | 2cy |
| 1 | 08/11/22 | 10:24 | EA | 1 | NNE | 45 | soar/hunt | 150 | ad female, met up with ad male 1000m N of map, pair carried on NNE |
| 1 | 08/11/22 | 11:18 | EA | 1 | ESE | 40 | hunt | 130 | |
| 1 | 08/11/22 | 11:21 | GP | 4 | NNE | 35 | roost | 120 | landed out of sight |
| 1 | 08/11/22 | 11:35 | WS | 7 | NNE | 5 | feed | 20 | same as 2, landed on loch |
| 2 | 08/11/22 | 12:44 | EA | 2 | WSW | 60 | soar | 220 | ad pair |
| 2 | 08/11/22 | 13:43 | EA | 2 | SSW | 33 | soar | 280 | ads, same as 14 |
| 2 | 08/11/22 | 14:54 | EA | 1 | SW | 40 | hunt | 200 | ad |
| 2 | 08/11/22 | 17:06 | NW | 7 | ESE | 65 | roost | 120 | |
| 2 | 22/11/22 | 07:00 | LE | 1 | | | | | on VP in headlights on arrival, flew off SE after few minutes |
| 2 | 22/11/22 | 07:59 | WE | 1 | NNW | 30 | roost | 80 | |
| 2 | 22/11/22 | 08:21 | HH | 1 | NNW | 18 | hunt | 100 | |
| 2 | 22/11/22 | 09:35 | HH | 2 | SSW | 55 | migrating | 320 | females |
| 2 | 22/11/22 | 09:40 | EA | 1 | ESE | 17 | hunt | 60 | ad female, landed in tree, remained there throughout |
| 1 | 22/11/22 | 12:20 | GP | 7 | NNW | 40 | | 250 | landed |
| 1 | 22/11/22 | 14:30 | EA | 1 | E | 5 | hunt | 20 | off map, had been on summit of Beinn Bhreac throughout, dropped out of sight |
| 1 | 22/11/22 | 14:46 | GP | 9 | NNW | 11 | | 270 | |
| 2 | 24/11/22 | 14:44 | EA | 1 | ENE | 30 | hunt | 130 | ad female |
| 2 | 24/11/22 | 15:05 | EA | 1 | SSE | 30 | hunt | 80 | ad female, same as 14 |
| 2 | 24/11/22 | 15:17 | HH | 1 | ENE | 41 | hunt/soar | 280 | female |
| 2 | 24/11/22 | 15:27 | EA | 1 | SSW | 48 | hunt/soar | 250 | ad male |
| 2 | 03/12/22 | 14:12 | HH | 1 | NE | 5 | hunt | 70 | female |
| 2 | 03/12/22 | 15:29 | HH | 1 | E | 4 | hunt | 110 | female |
| 2 | 03/12/22 | 16:46 | LE | 1 | ENE | 3 | hunt | 130 | in bins and thermal |



KILLEAN WIND FARM: WINTERING BIRD SURVEYS 2022-23



| | | | | | | | | | |
|---|----------|-------|----|-----|--------|-----|--------------|------|---|
| 1 | 04/12/22 | 09:25 | EA | 2 | SW | 40 | hunt/soar | 270 | ads, same as 14 |
| 1 | 04/12/22 | 09:34 | BK | 1 | SSW | 9 | | 40 | male |
| 2 | 04/12/22 | 13:06 | EA | 1 | N | 40 | hunt | 250 | ad female |
| 2 | 04/12/22 | 13:19 | EA | 1 | SSW | 50 | | 130 | ad female, full crop |
| 2 | 04/12/22 | 13:51 | EA | 2 | NNE | 50 | hunt/soar | 750 | ads, same as 11 + 12 |
| 2 | 09/01/23 | 14:38 | WE | 1 | SSW | 60 | hunt | 170 | imm, possibly transmitter |
| 2 | 09/01/23 | 15:55 | HH | 1 | NNE | 13 | | 80 | |
| 2 | 09/01/23 | 17:02 | NW | 82 | ENE | 55 | roost | 110 | |
| 2 | 09/01/23 | 17:08 | T | 7 | WSW | 8 | roost | 20 | in thermal imager, calling |
| 2 | 09/01/23 | 17:10 | T | 11 | SSW | 7 | roost | 45 | in thermal imager, calling |
| 1 | 12/01/23 | 10:08 | HH | 1 | SSE | 10 | hunt | 70 | male |
| 1 | 12/01/23 | 10:45 | EA | 1 | NE | 25 | hunt | 200 | ad, lost to view in valley |
| 1 | 12/01/23 | 10:50 | WE | 1 | SSE | 44 | hunt | 290 | imm, sat-tagged and wing-tagged green/purple X. Taken as a chick from Norway in 2021 and released on Shannon Estuary in Ireland. 9 months in western Scotland up to Mull. Prob same as seen on 9/1 from VP2 |
| 1 | 12/01/23 | 12:37 | HH | 1 | SE | 6 | hunt | 100 | female |
| 1 | 12/01/23 | 12:40 | WE | 1 | SSW | 30 | hunt | 200 | juv |
| 1 | 25/01/23 | 12:33 | EA | 2 | NNE | 35 | hunt | 190 | pair ads, dropped out of sight 500m N of map, flushed RN4 - possible dead sheep? Pair in that area yesterday on walkover too |
| 1 | 25/01/23 | 13:35 | EA | 1 | NE | 40 | hunt | 120 | ad, off map |
| 1 | 25/01/23 | 13:51 | EA | 1 | WNW | 43 | hunt | 580 | 2cy, usual occasional visitor, headed off north |
| 1 | 25/01/23 | 13:56 | EA | 1 | NNE | 40 | territorial | 540 | ad male, off map, same as 7, seeing off 8, eventually dropped into valley N of Cnoc Airigh Luachraich |
| 1 | 25/01/23 | 14:01 | EA | 2 | circle | 75 | soar | 720 | ads, new pair soaring, male sky-dancing briefly |
| 1 | 25/01/23 | 14:05 | EA | 1 | N | 75 | soar | 520 | ad female, off map, same as 7 |
| 1 | 25/01/23 | 15:45 | GP | 29 | circle | 45 | flushed | 630 | landed |
| 1 | 25/01/23 | 15:52 | EA | 2 | SW | 45 | soar | 780 | ads |
| 1 | 25/01/23 | 16:20 | GP | 29 | SW | 40 | flushed | 280 | same as 10, landed |
| 1 | 25/01/23 | 16:54 | NW | 92 | E | 35 | roost | 140 | landed on Loch Luireach |
| 2 | 06/02/23 | 17:54 | LE | 1 | E | 2 | hunt | 110 | |
| 2 | 14/02/23 | 07:27 | NW | 60 | WNW | 70 | roost | 30 | |
| 2 | 14/02/23 | 07:29 | NW | 95 | WNW | 80 | roost | 50 | |
| 1 | 14/02/23 | 17:04 | WE | 1 | SSE | 55 | hunt/roost | 380 | imm, just off map, dropped towards forest edge |
| 1 | 14/02/23 | 17:13 | EA | 2 | SSW | 40 | hunt/roost | 840 | off map - ad pair eventually dropped N of Cnoc Airigh Luachraich |
| 2 | 06/03/23 | 18:52 | NW | 8 | ENE | 45 | roost | 110 | |
| 2 | 06/03/23 | 18:53 | NW | 57 | ESE | 60 | roost | 140 | counted from photo |
| 1 | 07/03/23 | 06:33 | NW | 64 | NNW | 33 | roost | 150 | |
| 1 | 07/03/23 | 06:37 | NW | 36 | WNW | 45 | roost | 120 | off map |
| 1 | 07/03/23 | 08:10 | BK | 6 | WNW | 6 | feed | 45 | males, flew from lek |
| 1 | 07/03/23 | 10:40 | EA | 2 | circle | 140 | soar | 660 | pair off map |
| 1 | 07/03/23 | 10:47 | EA | 1 | SSW | 160 | soar/display | 1380 | ad female, initially displaying 3500m N of VP, off map |
| 1 | 07/03/23 | 10:54 | EA | 1 | S | 175 | soar/display | 1260 | ad male, joined 3, soaring over forestry, then both plummeted to west of site |
| 1 | 07/03/23 | 11:20 | WE | 1 | WNW | 240 | soar | 960 | ad |
| 1 | 07/03/23 | 11:24 | EA | 1 | SE | 150 | soar | 640 | ad male, same as 4, in response to WE |
| 1 | 07/03/23 | 11:47 | EA | 1 | NNE | 145 | soar/display | 780 | ad female, same as 3, west to display over Cnoc Airigh L. off map |
| 1 | 07/03/23 | 11:49 | EA | 1 | S | 125 | soar/display | 960 | ad male, same as 8, initially sky dancing over Cnoc Airigh then came south but returned following female |
| 2 | 07/03/23 | 13:38 | EA | 1 | SSE | 400 | | 230 | imm |
| 2 | 07/03/23 | 13:59 | WE | 1 | W | 60 | hunt | 160 | imm |
| 2 | 07/03/23 | 14:27 | EA | 1 | ESE | 115 | soar | 290 | ad female, off map, same as 9 |
| 2 | 07/03/23 | 14:31 | WE | 1 | SE | 155 | soar | 1320 | imm, same as 16 |
| 2 | 07/03/23 | 14:40 | EA | 2 | NNW | 175 | soar | 480 | ads, neighbouring pair (Blary) |
| 2 | 22/03/23 | 06:26 | GJ | 8 | WNW | 55 | roost | 140 | |
| 2 | 22/03/23 | 09:29 | HH | 1 | ENE | 35 | | 130 | female |
| 1 | 22/03/23 | 14:06 | EA | 1 | NE | 50 | hunt | 330 | imm female, unfamiliar imm, very similar to one on Rathlin on 18/3 |
| 1 | 22/03/23 | 14:11 | EA | 1 | ENE | 38 | mobbing EA | 120 | ad male, off map, usual male |
| 1 | 22/03/23 | 15:10 | GP | 9 | SSW | 100 | | 150 | |
| 1 | 22/03/23 | 16:59 | EA | 1 | circle | 25 | hunt/soar | 130 | ad female, off map |
| 1 | 22/03/23 | 17:28 | EA | 1 | W | 65 | hunt | 400 | ad, off map |
| 1 | 22/03/23 | 17:32 | GP | 400 | circle | 100 | flushed | 220 | off map. Beinn on Tuirc area |
| 1 | 22/03/23 | 18:17 | BK | 2 | WSW | 9 | roost | 30 | females |



