

TECHNICAL APPENDIX 7.5: Balgray Wind Farm Autumn Bird Surveys 2023



Report to Fred Olsen Renewables Ltd

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BALGRAY PROPOSED WIND FARM: AUTUMN BIRD SURVEYS 2023

Introduction

1. This report describes further autumn bird survey work carried out for a proposed wind farm at Balgray, Dumfries and Galloway. It provides two additional months' baseline data on the bird populations, activity and flight paths within the vicinity of the wind farm site to inform subsequent ornithological impact assessment, to fill the gap in data collection during the 2022-23 season and hence complete two full years of baseline.
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 Stuart Piner, a highly experienced bird surveyor.

Study Area

3. The site is located about 7 km north-east of Lockerbie in Dumfries and Galloway. The wintering bird survey areas were chosen to include all areas within the possible zone of ornithological influence of the wind farm (Figure 1). This included the wind farm site, plus a 500 m buffer for the main winter walkover surveys (the core survey area, following NatureScot guidance, SNH 2017) and a 2 km 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 covered a total area of 15.1 km² and the wider survey area 44.3 km². It comprised predominantly upland moorland habitat, currently used mainly for grazing sheep, surrounded by commercial conifer plantation and agriculturally improved grassland.

Autumn Bird Survey Methods

4. The aim of the autumn 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 and vantage point surveys of bird flight activity. The surveys were undertaken during September and October 2023.

Autumn Walkover Surveys

5. Walkover mapping surveys of the wintering birds within the site and a 500 m 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 (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. Four surveys were undertaken at approximately fortnightly intervals during September and October 2023.

Goose Feeding Distribution Surveys

7. Additional surveys were undertaken twice-monthly of all possible habitats that could be used by wintering waterfowl (including pink-footed geese, greylag geese and whooper swans) as feeding/roosting sites within 2 km of the site (to give contextual information about where goose feeding flocks were located, and provide further information on possible linkage to SPAs). The site lies within the potential SPA connectivity distance from the Castle Loch SPA (for which pink-footed geese are a qualifying feature) and within a known goose feeding area (Mitchell 2012, SNH 2013),

Vantage Point Surveys

8. 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 recorded. Target species were the same as those set out above for the walkover surveys.
9. The specific aim of the VP surveys was to collect data on key target species flight activity to enable estimates 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.
10. Two vantage points were used to cover the wind farm site. The computer-generated viewsheds (using Global Mapper v21) are shown in Figure 1. For each VP, a total of 24 hours of VP surveys were carried out during the autumn from each VP (as set out in NatureScot guidance, SNH 2017). As the site lies within the potential SPA connectivity distance from the Castle Loch SPA (for which pink-footed geese are a qualifying feature) and within a known goose feeding area (Mitchell 2012, SNH 2013), additional surveys were carried out to provide extra coverage in the goose migration season.
11. 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).
12. 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 10 m estimates were made to 1 m, between 10 and 20 m to 2 m, between 20 m and 50 m to 5 m, and above 50 m to 10 m. 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.

Autumn Bird Survey 2023 Results

Autumn Walkover Survey Results

13. Table 1 summarises the bird populations found within the survey area during each of the monthly walkover surveys. It shows the total numbers recorded during each survey and the overall peak counts. Overall, only low numbers of birds were recorded using the site during

these surveys, as in the previous winter survey, though the larger lochs did support a range of wintering waterfowl.

Table 1. Autumn bird populations recorded in the Balgray survey area during the September-October 2023 walkover surveys, and comparison with previous autumn/winter peaks.

Species	Sep 08 2023	Sep 20 2023	Oct 05 2023	Oct 19 2023	Peak 2021-22	Peak 2022-23
Mute Swan	9	11	8	8	11	7
Whooper Swan	0	0	0	4	6	8
Pink-footed Goose	0	0	0	0	96	91
Greylag Goose	0	0	0	0	1	4
Canada Goose	0	0	0	0	4	6
Wigeon	0	0	15	21	2	2
Teal	1	0	4	40	60	170
Mallard	47	16	75	42	37	62
Pintail	0	0	0	4	0	0
Tufted Duck	3	5	1	0	9	5
Goldeneye	0	0	0	0	1	2
Goosander	0	0	0	0	2	4
Red Grouse	0	0	0	0	0	1
Little Grebe	5	0	2	2	3	4
Cormorant	0	0	0	0	2	0
Grey Heron	1	0	0	0	2	1
Red Kite	1	5	4	0	13	10
Marsh Harrier	0	0	0	1	0	0
Hen Harrier	0	0	0	0	1	1
Goshawk	0	0	0	0	1	1
Sparrowhawk	0	0	0	0	1	1
Buzzard	7	13	11	3	16	16
Golden Eagle	0	0	0	0	1	0
Osprey	0	0	0	0	1	0
Kestrel	5	5	4	4	4	3
Merlin	0	0	0	0	1	1
Peregrine	0	0	0	0	2	1
Moorhen	0	0	0	0	0	4
Oystercatcher	0	0	0	0	2	2
Golden Plover	0	0	0	0	20	13
Lapwing	0	0	0	0	13	74
Jack Snipe	0	0	0	0	1	0
Snipe	0	0	9	8	14	4
Woodcock	0	0	0	0	1	1

Species	Sep 08 2023	Sep 20 2023	Oct 05 2023	Oct 19 2023	Peak 2021-22	Peak 2022-23
Curlew	0	0	0	0	1	1
Green Sandpiper	0	0	0	0	2	0
Redshank	0	0	0	0	1	0
Common Gull	0	0	0	0	0	15
Lesser Black-backed Gull	0	0	0	0	47	0
Herring Gull	0	0	0	0	6	1
Great Black-backed Gull	0	0	0	0	2	1
Barn Owl	0	0	0	0	0	2
Short-eared Owl	0	0	0	0	2	2
Raven	0	0	0	0	1	4
Common Crossbill	2	0	0	1	6	11

Autumn Wider Area Goose Feeding Distribution Survey Results

14. Table 2 summarises the bird populations found within the survey area during each of the fortnightly goose distribution surveys. It shows the total numbers recorded during each survey and the overall peak counts (with those from 2021-22 and 2022-23 also given for comparison). Like 2021-22 and 2022-23, there were no records of any geese feeding within the survey area.

Table 2. Autumn bird populations recorded in the wider (2km buffer) Balgray survey area during the September-October 2023 goose feeding distribution surveys (survey totals).

Species	Sep 08 2023	Sep 20 2023	Oct 05 2023	Oct 19 2023	Peak 2021-22	Peak 2022-23
Greylag Goose	0	0	0	0	0	2
Teal	0	6	0	0	0	5
Mallard	0	0	0	3	24	4
Goldeneye	0	0	0	0	0	1
Grey Heron	0	0	0	1	4	4
Red Kite	5	12	15	7	23	10
Buzzard	7	22	17	23	25	3
Peregrine	0	1	0	0	0	1
Oystercatcher	0	0	0	0	2	2
Lapwing	0	0	0	0	0	2
Curlew	0	0	0	0	1	1
Common Gull	0	0	0	0	0	15
Herring Gull	0	0	0	0	6	1
Great Black-backed Gull	0	0	0	0	2	1

Vantage Point Survey Results: Autumn 2023

15. The rates of bird flight movement observed across the survey area during the vantage point surveys are summarised in Table 3. This gives the flight rate per hour recorded each month and the total number of flights recorded. Flight rates over the survey area were generally low, as they had been in the previous winters (Tables 4 and 5), though the site continued to be regularly used by red kites. There were also occasional records of several other key raptors (marsh harrier, hen harrier, goshawk, and hobby), whooper swan and pink-footed geese.
16. Table 3 also gives the percentage of flights of each species recorded at rotor height (taking rotor height conservatively as between 21m and 200m above ground level).

Table 3. Bird flight rates recorded over the Balgray survey area during the September-October 2023 vantage point surveys. N = 24 hours total observation from each of the two VPs.

Species	Sep 2023	Oct 2023	Total number of birds overflying	% flights at rotor height
Mute Swan	0.13	-	3	0%
Whooper Swan	-	0.17	4	100%
Pink-footed Goose	11.33	-	272	57%
Teal	0.08	-	2	0%
Mallard	0.50	2.67	76	25%
Red Kite	2.04	1.38	82	45%
Marsh Harrier	-	0.08	2	50%
Hen Harrier	0.08	0.04	3	67%
Goshawk	0.25	0.04	7	50%
Sparrowhawk	0.25	0.04	7	83%
Buzzard	3.08	2.83	142	78%
Kestrel	1.46	1.04	60	19%
Hobby	-	0.04	1	0%
Snipe	-	0.17	4	0%
Lesser Black-backed Gull	0.04	0.29	8	100%

Table 4. Bird flight rates recorded over the Balgray survey area during the November 2022 - March 2023 vantage point surveys. N = 48 hours total observation from each of the two VPs.

Species	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Total number of birds overflying	% flights at rotor height
Mute Swan	-	-	-	-	0.1	2	100%
Whooper Swan	0.2	0.2	0.5	0.5	0.6	41	89%
Pink-footed Goose	2.7	-	15.9	1.1	4.9	399	100%
Greylag Goose	0.1	-	0.3	0.3	-	14	100%
Canada Goose	-	-	-	-	0.2	4	100%
Teal	1.3	5.5	3.8	-	0.8	156	50%
Mallard	0.2	-	2.8	0.2	0.3	49	57%
Tufted Duck	-	-	0.4	-	-	5	100%
Goldeneye	-	-	-	0.1	-	2	100%
Goosander	-	0.4	-	-	-	4	100%
Red Kite	0.6	0.6	0.9	1.3	1.5	98	56%
Hen Harrier	-	0.1	0.3	0.2	-	10	0%

Species	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Total number of birds overflying	% flights at rotor height
Goshawk	-	0.1	0.1	0.2	0.2	13	77%
Sparrowhawk	-	-	0.1	0.2	0.1	9	38%
Buzzard	0.8	0.3	1.1	1.6	0.3	78	67%
Kestrel	0.9	0.8	0.9	0.8	0.5	70	19%
Merlin	-	-	-	-	-	2	50%
Peregrine	-	-	-	0.1	-	4	100%
Oystercatcher	-	-	-	0.1	-	3	100%
Golden Plover	0.5	-	-	-	0.3	20	100%
Lapwing	0.1	2.2	-	5.4	0.3	165	92%
Snipe	-	0.4	0.2	-	0.3	13	67%
Woodcock	-	-	-	-	-	1	0%
Curlew	-	-	-	0.1	-	2	100%
Common Gull	1.2	1.6	-	-	-	46	100%
Great Black-backed Gull	0.1	-	-	0.3	-	8	67%
Short-eared Owl	-	-	-	-	0.1	3	0%

Table 5. Bird flight rates recorded over the Balgray survey area during the September 2021 - March 2022 vantage point surveys. N = 72 hours total observation from each of the two VPs.

Species	Flight rate (birds/hour)							Total number of birds overflying	% flights at rotor height
	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022		
Mute Swan	-	-	-	-	0.5	0.1	0.1	25	0%
Pink-footed Goose	-	63.3	-	1.4	0.4	0.4	1.5	3237	54%
Canada Goose	-	0.1	-	-	-	-	-	7	50%
Mallard	0.2	-	-	-	-	-	0.1	17	17%
Goosander	-	0.1	-	-	-	-	-	4	0%
Cormorant	-	0.1	-	-	-	-	-	6	0%
Grey Heron	-	-	-	-	-	-	-	7	40%
Red Kite	0.6	0.6	2.1	1.2	1.5	1.9	0.2	323	85%
Hen Harrier	0.1	0.1	-	-	-	0.1	0.1	21	29%
Goshawk	0.1	0.1	0.1	-	-	0.1	-	16	44%
Sparrowhawk	0.1	0.1	-	-	-	-	-	7	57%
Buzzard	1.0	1.0	0.9	0.8	0.6	1.7	1.8	336	61%
Golden Eagle	-	-	-	0.2	-	-	-	5	40%
Osprey	-	-	-	-	-	-	-	1	100%
Kestrel	0.7	0.7	0.5	0.3	0.4	0.1	-	112	48%
Merlin	0.1	-	-	-	-	-	-	4	50%
Peregrine	-	-	-	-	-	-	-	3	100%
Oystercatcher	-	-	-	-	-	-	-	1	0%
Golden Plover	0.1	0.6	-	-	-	-	0.6	61	33%
Lapwing	0.5	-	-	-	-	-	-	27	50%
Snipe	0.1	-	-	-	-	-	0.1	14	50%
Woodcock	-	-	-	-	-	-	-	2	0%
Redshank	-	-	-	-	-	-	-	1	100%

Species	Flight rate (birds/hour)							Total number of birds overflying	% flights at rotor height
	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022		
Lesser Black-backed Gull	0.1	0.1	-	-	-	-	1.4	84	77%
Herring Gull	-	-	-	-	0.3	-	-	11	75%
Great Black-backed Gull	-	-	-	0.3	-	0.1	-	14	86%
Short-eared Owl	-	-	-	-	-	0.1	-	7	20%

Conservation Evaluation of Wintering Bird Populations

17. The conservation value of the wintering bird populations was determined using the criteria specified in Table 6 (from Percival 2007) and is summarised in Table 7. This includes the criteria adopted by NatureScot in 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). In addition, listing on Annex 1 of the EU Birds Directive, Schedule 1 of the Wildlife and Countryside Act 1981, UK BAP priority species and Scottish BAP species were all considered in the evaluation process.

Table 6. 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 an 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).
NEGLIGIBLE	Green-listed species (Stanbury <i>et al.</i> 2021) of favourable conservation status

18. The conservation value of the wintering bird populations observed in the Balgray survey area during the wintering bird surveys has been summarised in Table 7 below. This included one very high sensitivity species (pink-footed goose – the birds seen could be ecologically linked to the Castle Loch SPA), 15 high-sensitivity species (whooper swan, goldeneye, osprey, red kite, golden eagle, marsh harrier, hen harrier, goshawk, peregrine, merlin, hobby, golden plover, green sandpiper, short-eared owl and common crossbill) that are EU Birds Directive Annex 1/Wildlife and Countryside Act Schedule 1 species, three medium sensitivity species (UK BAP priority/red-listed species of conservation concern; lapwing, curlew and herring gull), and 12 low sensitivity species.

Table 7. Conservation evaluation of the wintering bird populations in the Balgray survey area, September 2021 – March 2022, November 2022 – March 2023 and September – October 2023.

Species	Peak count (core)	Peak count (wider)	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	11	7						Negligible
Whooper Swan	6	8	✓	✓	A		✓	High
<i>Pink-footed Goose</i>	96	91			A			<i>Very high</i>
Greylag Goose	1	4			A			Low
Canada Goose	4	6						Negligible
Wigeon	21	2			A			Low
Teal	60	170			A			Medium
Mallard	75	62			A			Low
Tufted Duck	9	5						Negligible
Goldeneye	1	2		✓	R			High
Goosander	2	4						Negligible
Red Grouse	0	1				✓		Medium
Little Grebe	5	4						High
Cormorant	2	0						Negligible
Grey Heron	2	1						Negligible
Red Kite	13	23	✓	✓			✓	High
Marsh Harrier	1	0	✓	✓	A		✓	High
Hen Harrier	1	1	✓	✓	R		✓	High
Goshawk	1	1		✓				High
Sparrowhawk	1	1			A			Low
Buzzard	16	25						Negligible
Golden Eagle	1	0	✓	✓			✓	High
Osprey	1	0	✓	✓	A		✓	High
Kestrel	5	3			A		✓	Low
Hobby	1	0		✓			✓	High
Merlin	1	1	✓	✓	R		✓	High
Peregrine	2	1	✓	✓			✓	High
Moorhen	0	4			A			Low
Oystercatcher	2	2			A			Low
<i>Golden Plover</i>	20	13	✓				✓	<i>High</i>
Lapwing	13	74			R	✓	✓	Medium
Jack Snipe	1	0						Negligible
Snipe	14	4			A			Low
Woodcock	1	1			R		✓	Low
Curlew	1	1			R	✓	✓	Medium
Green Sandpiper	2	0		✓	A		✓	High
Redshank	1	0			A			Low
Common Gull	0	15			A			Low
Lesser Black-backed Gull	47	0			A			Low

Species	Peak count (core)	Peak count (wider)	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
Herring Gull	6	1			R	✓	✓	Medium
Great Black-backed Gull	2	1			A			Low
Barn Owl	0	2		✓			1	High
Short-eared Owl	2	2	✓		A		1	High
Raven	1	4						Negligible
Common Crossbill	6	11		✓				High

Note: species in italics seen over-flying only.

19. The key autumn/wintering birds recorded were as follows:

- **Pink-footed Goose** – a total of 3,237 flights were observed during the 2021-22 VP surveys, but 96% of those occurred during 6-8 October 2021. Fewer (399 flights) were recorded in 2022-23 (though that did not include the main October migration period), and only 272 in autumn 2023. Apart from this brief period of activity in October 2021, the only other records were of small numbers of migrant flocks over-flying the survey area. Their flight lines are shown in Figure 2. There were no records of any feeding flocks within the survey area in either winter. There was no evidence of any clear link to the Castle Loch SPA, with flights occurring in all directions across the site. As the wind farm site is clearly not within an important goose feeding area, the only impact of the development on this species would be collision risk, which, given the numbers observed, would be unlikely to be significant.
- **Teal** – regionally important numbers were recorded in 2022-23 (peak 170), though there had been fewer in the previous winter (peak 60) and only 40 in autumn 2023. Most records were from Hallhills Loch in the northern part of the site, with a smaller number of records from the smaller loch just outside the south-eastern corner of the site.
- **Other wintering wildfowl** – the core walkover survey area was used by a range of other wintering waterfowl species but only in low (locally important) numbers. This included **whooper swan, wigeon, mallard** and **goldeneye**. Most records were from Hallhills Loch in the northern part of the site, with a smaller number of records from the smaller loch just outside the south-eastern corner of the site.
- **Red Kite** – this species was observed regularly hunting and over-flying the site, with a total of 323 flights recorded in 2021-22, 98 in 2022-23 and 82 in autumn 2023 (Figure 3). The site is clearly important for this species at this time of year.
- **Golden Eagle** – none were recorded during the autumn 2023 surveys (as in 2022-23). However, five flights were observed during the 2021-22 VP surveys, all of the same juvenile bird and all between 10-16 December 2021. It is likely, given the location of the site, that this was a bird from the South Scotland Golden Eagle Project release scheme. Given the habitat present and the fact that it did not stay in the area, this would suggest that this area is not important for this species.
- **Hen harrier** – this species was regularly seen hunting over the site through the winter, with 21 flights in total in 2021-22, 10 in 2022-23 and three in autumn 2023 (see Figure 4). No evidence was found of any night roost in the survey area in either winter, and most flights seen were below rotor height (so collision risk would be low).
- **Goshawk** – this species was observed regularly during the winter VP surveys, with 16 flights in total in 2021-22, 13 in 2022-23 and 7 in autumn 2023 (Figure 5). It was seen mostly over the forestry rather than the open ground of the site itself.
- **Other scarce raptors and owls** – osprey, marsh harrier, peregrine, merlin, hobby, barn owl and short-eared owl were all recorded during the winter surveys, but only infrequently in

low numbers. Figure 6 shows the flight lines from the VP surveys in autumn 2023 for the two of these species that were recorded during these surveys (marsh harrier and hobby). There was no indication that the survey area was important to any of these species at this time of year.

Conclusions

20. The 2021-22, 2022-23 and autumn 2023 bird surveys found a range of wintering bird populations of conservation importance but generally (apart from red kite) only low numbers within/in proximity to the wind farm site in numerical terms and/or in the context of their regional (NHZ) populations.
21. Pink-footed geese had been initially considered a potentially important species in the area given the proximity to the Castle Loch SPA (within its SPA connectivity range, SNH 2017) and the potential feeding habitat (agricultural grassland and arable land) around the site. However, the goose feeding distribution surveys did not record any pink-footed geese at all feeding within 2 km of the site. There were some flocks seen over-flying the site, though most of these were seen during a short period in early October 2021 and there was no evidence of any clear link to the Castle Loch SPA.
22. Red kites were seen in regionally important numbers using the site and were recorded regularly during all the surveys. Flight activity overall was considerably higher than recorded in the summer (Percival *et al.* 2021 and Percival *et al.* 2022). Given their use of the site, further analysis was undertaken to more clearly define the areas of importance to inform the site design. Figure 7 shows a heatmap of red kite flight density across the VP survey area for the 2021-22, 2022-23 and autumn 2023 data combined. The core area (holding 50% of the survey records) is shown. Overall, the main area of red kite flight activity was in the central and south-western edge of the wind farm site, particularly over the slopes of Shielstead Hill, to the south of Hallhills Loch.
23. Other raptor species, including golden eagle, marsh harrier, hen harrier, goshawk, osprey, peregrine, merlin, hobby, barn owl and short-eared owl, were recorded in lower numbers and less frequently.

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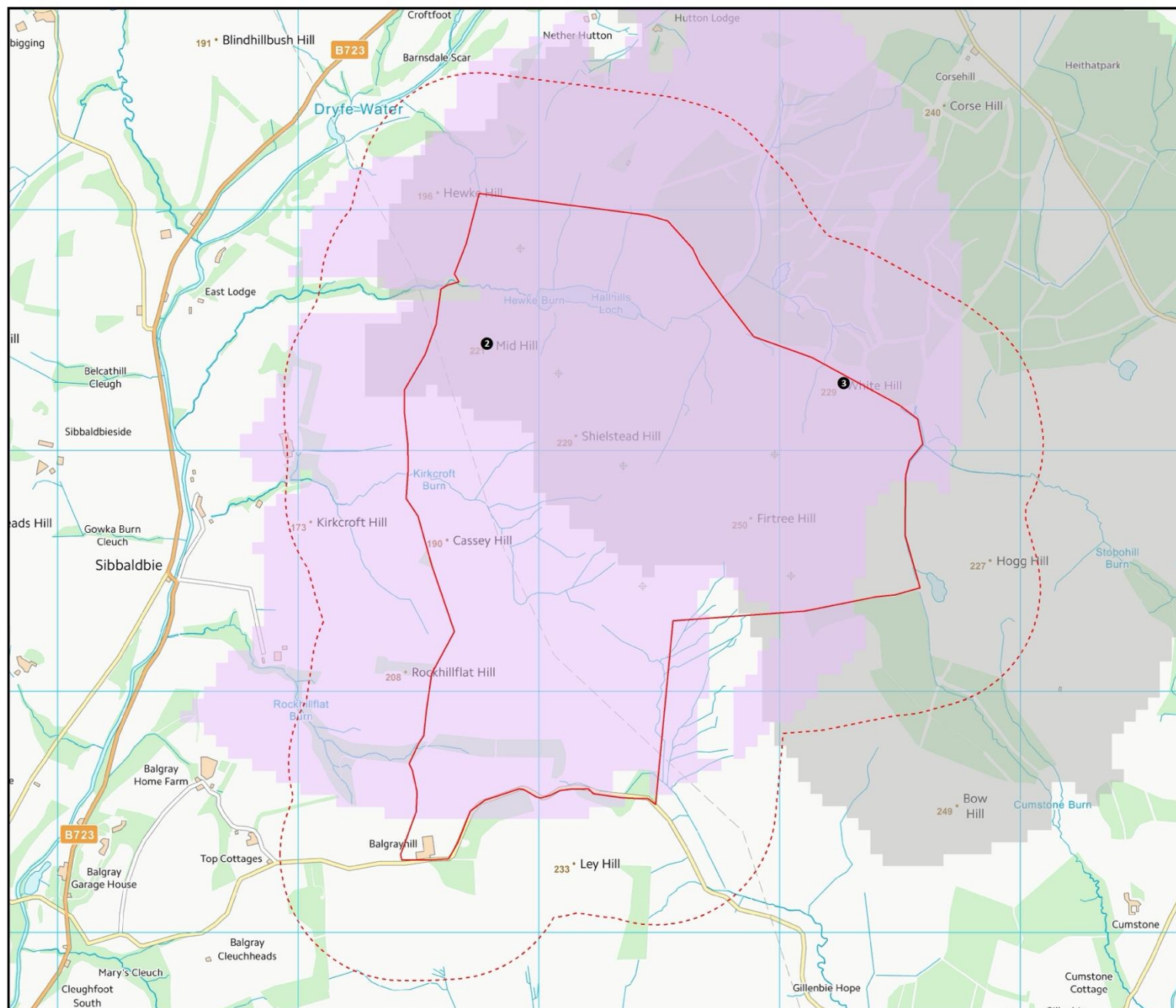
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Balgray Proposed Wind Farm

FIGURE 1

Core Winter Walkover and VP Survey Areas

KEY:

- Site Boundary
- Core 500m buffer survey area
- Proposed turbines
- Vantage points
- VP2 viewshed
- VP3 viewshed



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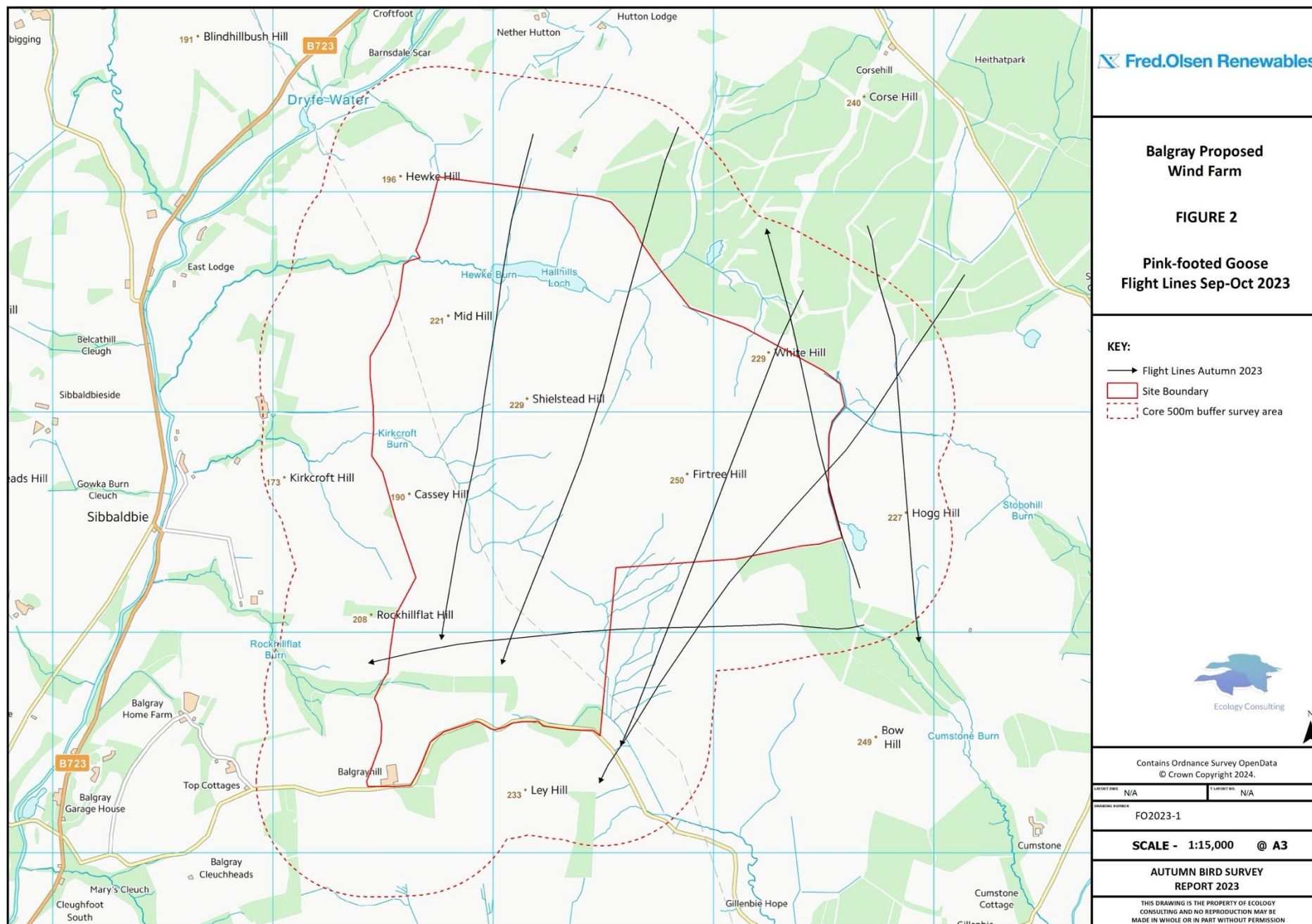
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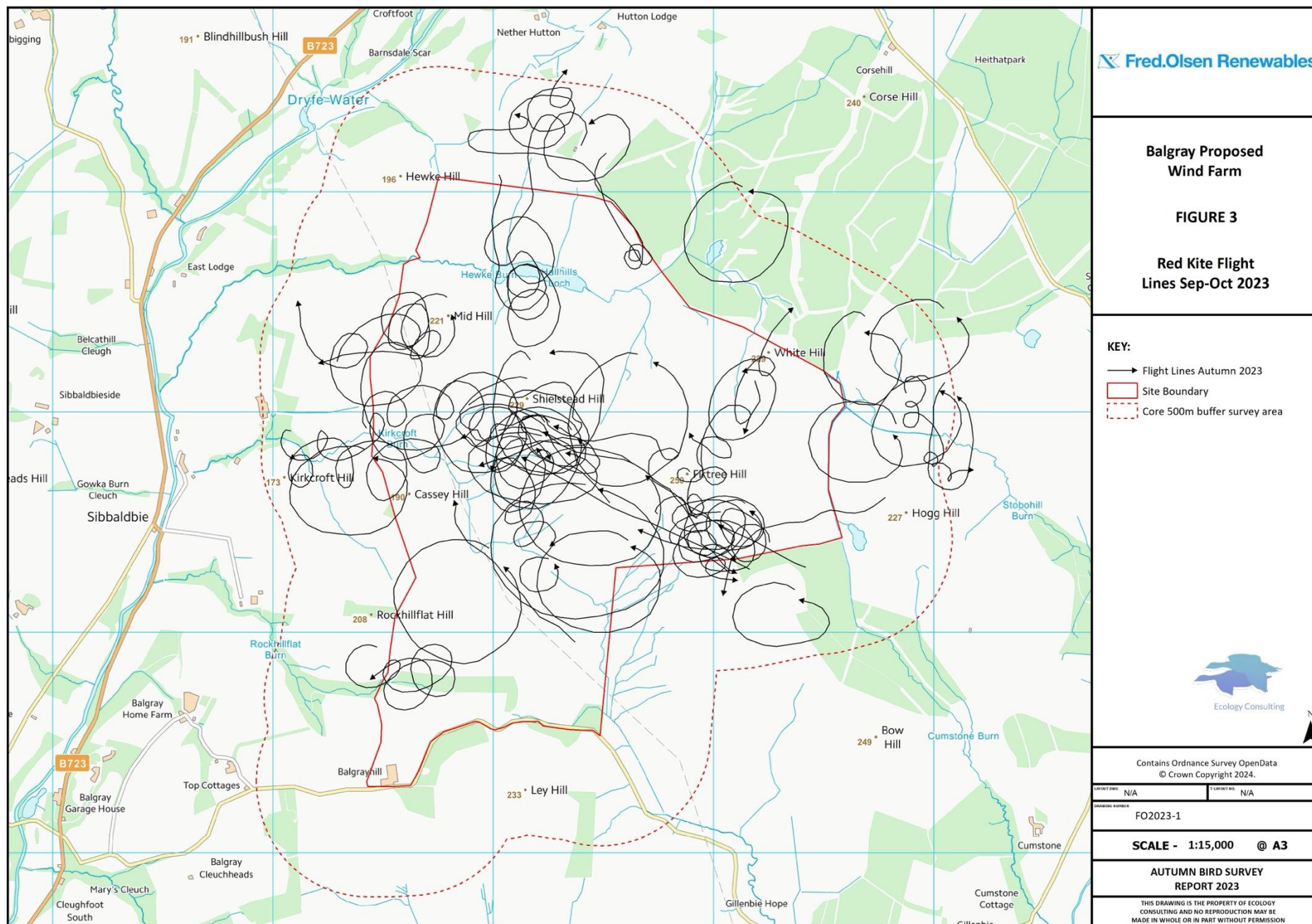
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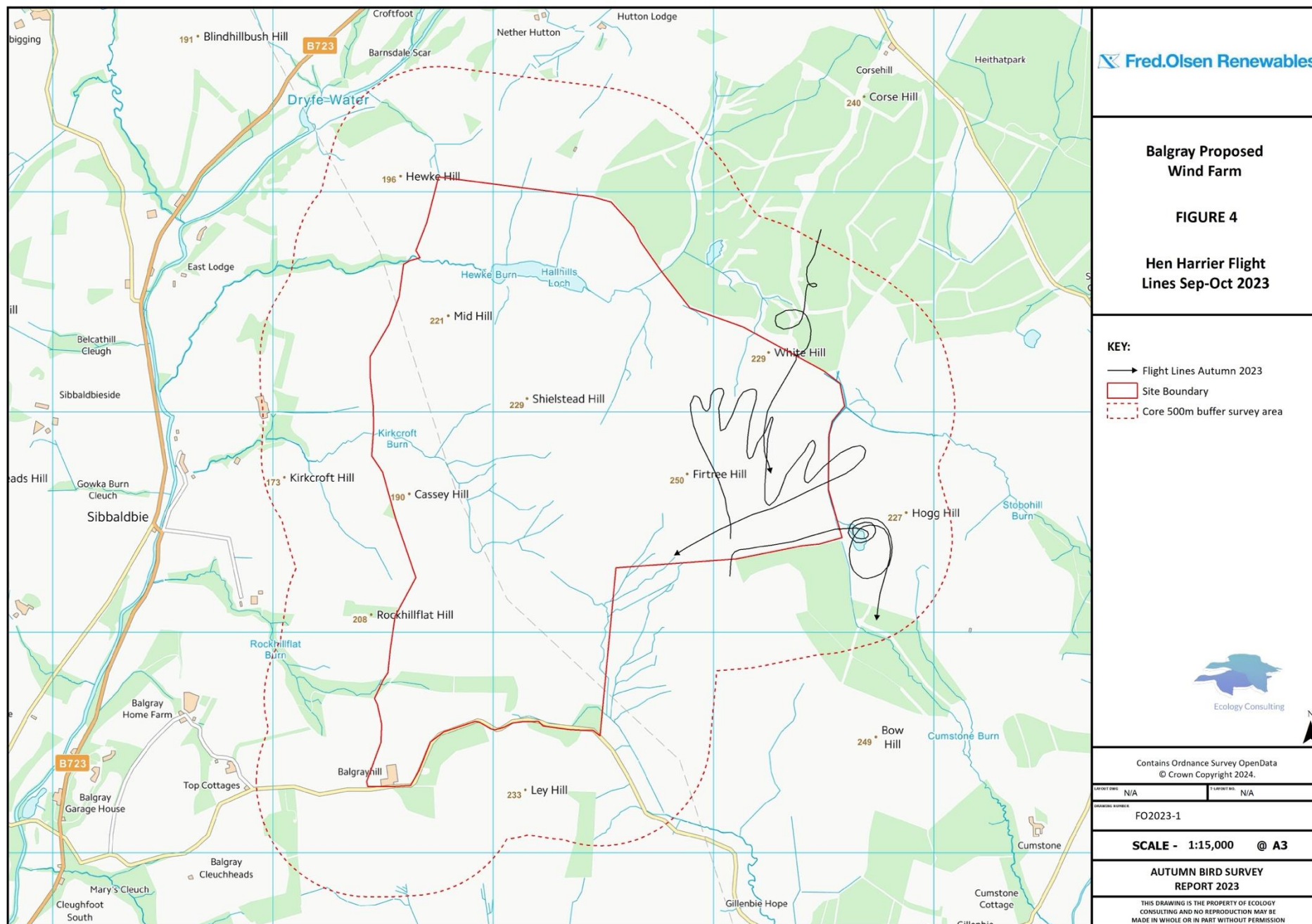
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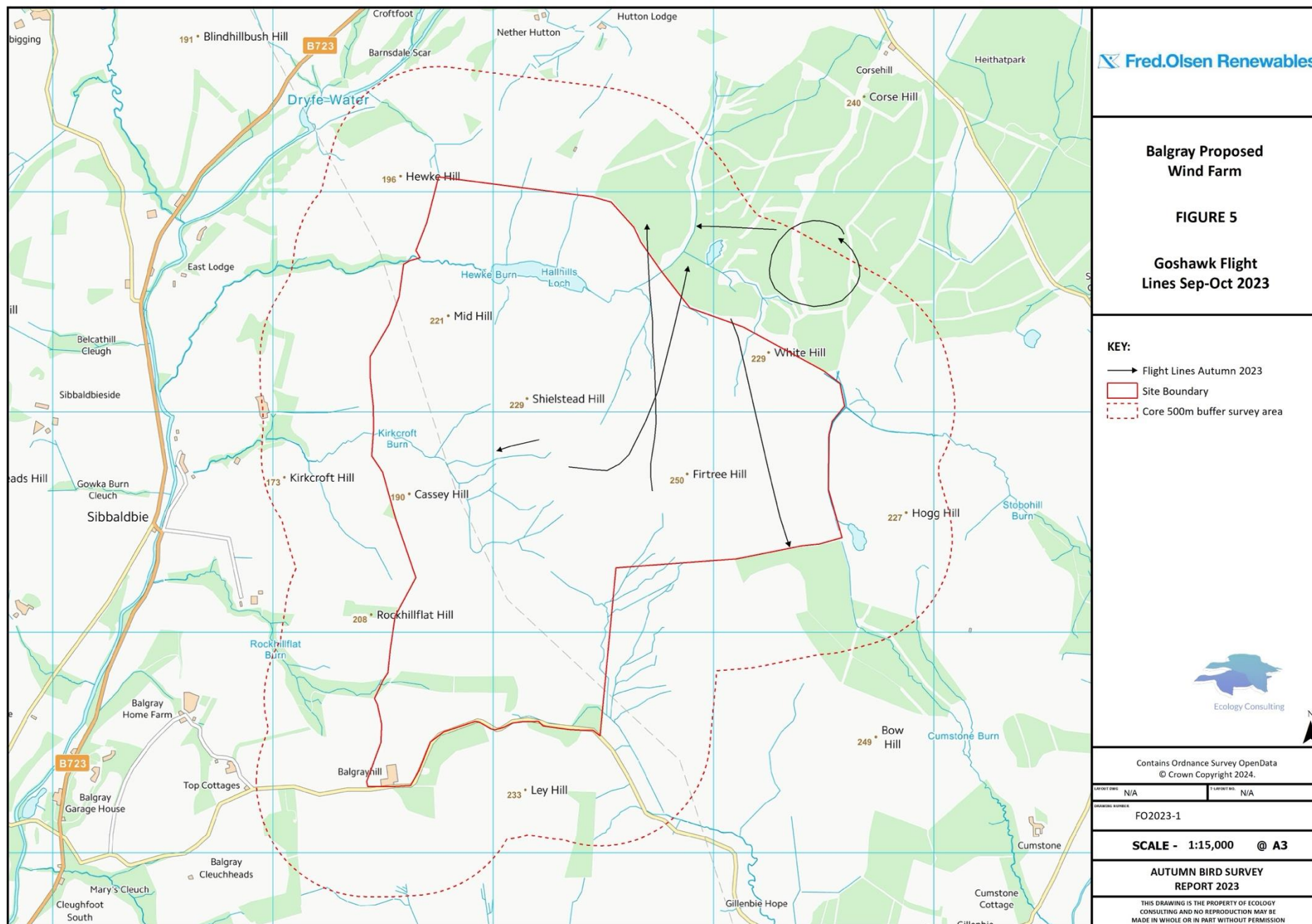
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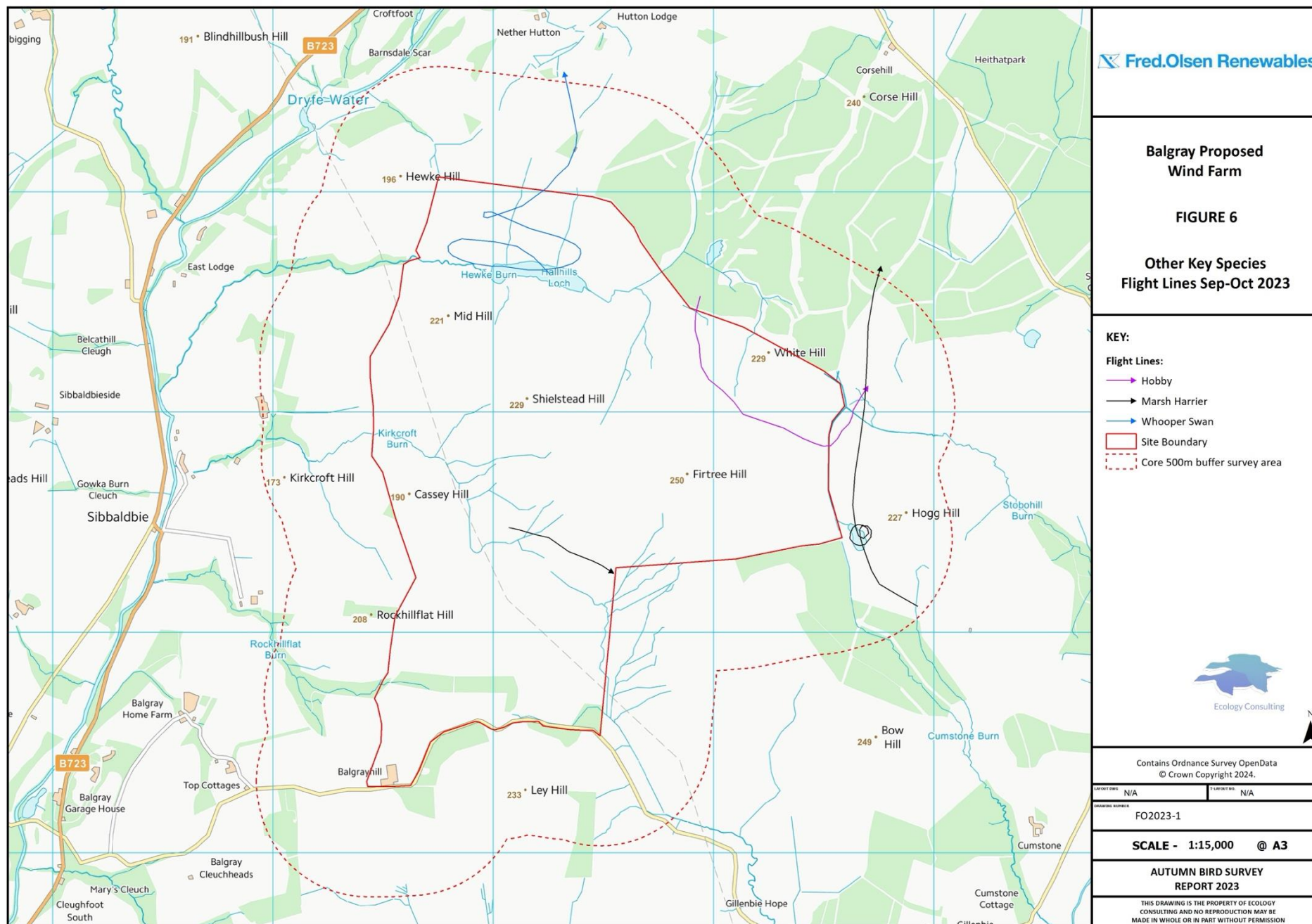
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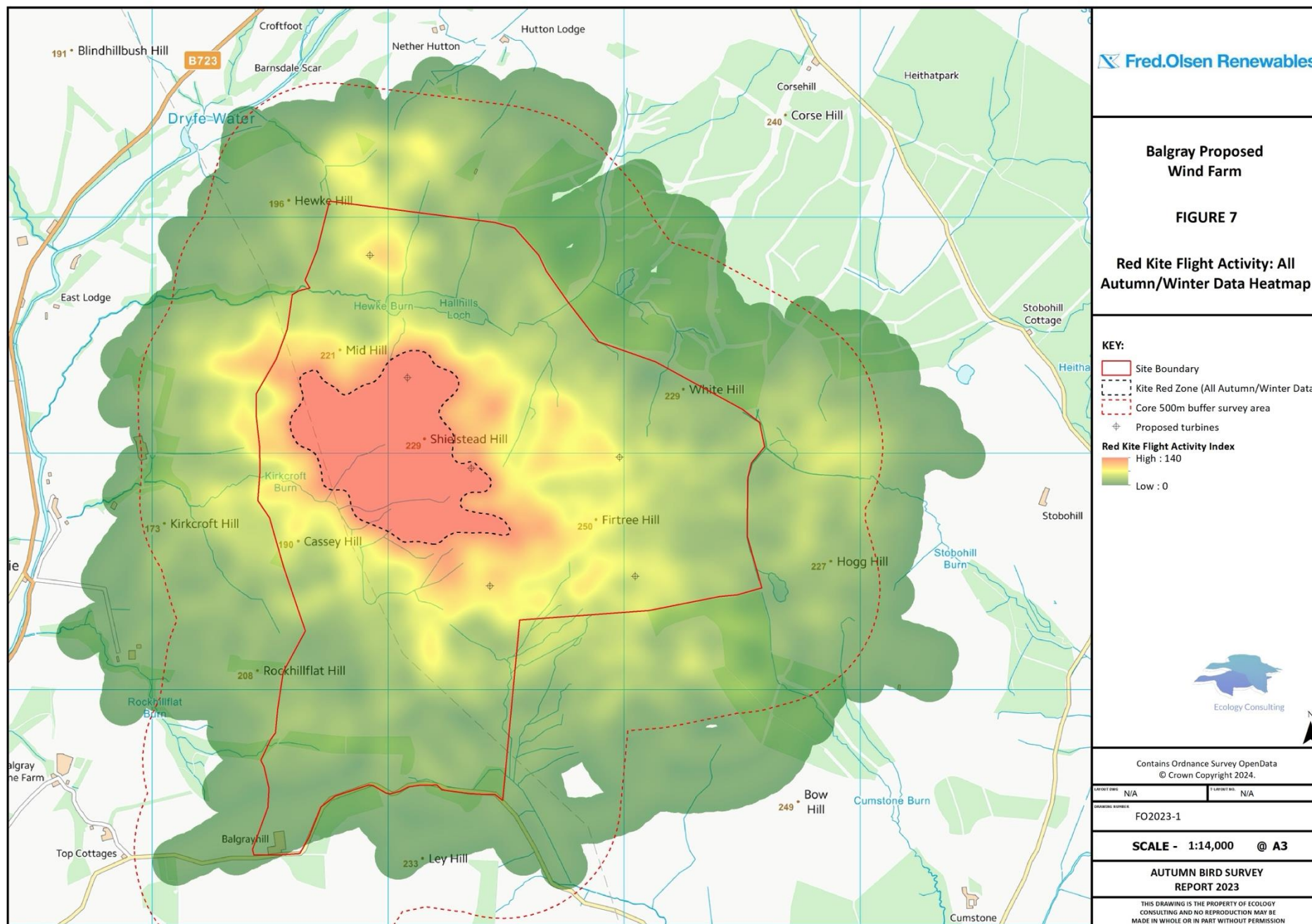












APPENDIX 1. VANTAGE POINT SURVEY DATA

Survey Information

Date	Vantage Point No	Start time	Finish time	Weather	Observer
08/09/2023	2	10:00	13:00	2-1/8 cloud, 0-2 SSW wind, excellent, vis, 21 to 24C	Stuart Piner
08/09/2023	2	13:30	16:30	0/8 cloud, 1-2 SSW wind, excellent vis, 24 to 25C	Stuart Piner
13/09/2023	3	07:20	10:20	0/8 cloud, 2-3 E - ESE wind, excellent vis, 8 to 12C	Stuart Piner
13/09/2023	3	10:50	13:50	0-6/8 cloud, 2-3 SE wind, excellent vis, 12 to 14C	Stuart Piner
21/09/2023	2	13:15	16:15	2-5/8 cloud, 4-5 SW wind, very good vis	Stuart Piner
21/09/2023	2	16:45	19:45	4-6/8 cloud, 4-3 SW wind, very good vis, brief showers	Stuart Piner
29/09/2023	3	06:30	09:30	8-5/8 cloud, 4 WSW wind, very good vis, very brief shower	Stuart Piner
29/09/2023	3	10:00	13:00	4-6/8 cloud, 4 WSW - W wind, very good vis	Stuart Piner
04/10/2023	2	09:00	12:00	8/8 cloud, 4-5 SW wind, very good vis	Stuart Piner
04/10/2023	3	12:30	14:00	8/8 cloud, 5 SW wind, very good vis	Stuart Piner
04/10/2023	3	16:10	19:10	8/8 cloud, 3-4 SW wind, good - ok vis, long periods of steady but light rain	Stuart Piner
05/10/2023	2	06:45	09:45	8/8 cloud, 2 S-SW wind, good - ok vis, (brief period of poor vis), light rain	Stuart Piner
13/10/2023	3	12:15	15:15	3-6/8 cloud, 4-5 W wind, very good vis	Stuart Piner
19/10/2023	2	09:35	12:35	8/8 cloud, 4-5 E wind, good - very good vis, steady light rain then fine	Stuart Piner
19/10/2023	2	13:05	16:05	8/8 cloud, 5-3 E wind, good - very good vis, fine then steady rain then fine	Stuart Piner
20/10/2023	3	07:20	10:20	7-8/8 cloud, 4-6 E wind, very good vis	Stuart Piner
20/10/2023	3	10:50	12:20	8/8 cloud, 4-6 E wind, very good vis	Stuart Piner

Key Species Data

VP	Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time bird observed (sec)	Notes
2	08/09/2023	10:24	KT	1		21	hunt	960	juv
2	08/09/2023	10:26	KT	1		100		600	
2	08/09/2023	10:35	KT	3		140		420	
2	08/09/2023	10:46	KT	1		50		210	
2	08/09/2023	11:04	KT	2		45		600	
2	08/09/2023	11:47	KT	1	circle E	30		150	
2	08/09/2023	12:12	KT	1	SSE	5		600	
2	08/09/2023	12:14	GI	2		100		420	adults
2	08/09/2023	12:25	KT	2		175		2100	until VP end
2	08/09/2023	13:30	KT	1		125		720	from VP start
2	08/09/2023	13:58	KT	3		225		1800	
2	08/09/2023	14:57	KT	1		2		30	
2	08/09/2023	15:06	KT	1		5		75	adults
2	08/09/2023	16:16	KT	1		30		1260	
3	13/09/2023	07:21	PG	70	SSW	225	migrants	240	
3	13/09/2023	07:42	PG	85	SSE	200	migrants	170	
3	13/09/2023	08:15	PG	22	SSW	25	migrants	180	
3	13/09/2023	08:17	GI	1	SSE	9		50	adult male, flew between woods
3	13/09/2023	08:44	GI	1	WSW	15		8	female, mobbed by corvids
3	13/09/2023	08:51	PG	24	SSW	190	migrants	180	
3	13/09/2023	09:43	KT	1	circle S	10		90	
3	13/09/2023	09:46	KT	1	WSW	18	hunt	110	
3	13/09/2023	09:55	PG	39	NNW	300		240	
3	13/09/2023	09:56	PG	10	W	300		360	
3	13/09/2023	10:50	KT	1	circle NW	60		360	from VP start
3	13/09/2023	11:02	KT	5		150		360	
3	13/09/2023	11:06	GI	1	E	18		110	juv
3	13/09/2023	12:09	HH	1		16	hunt	750	female
3	13/09/2023	12:14	KT	1		100		300	
3	13/09/2023	12:19	KT	1	circle NNE	30		120	
3	13/09/2023	13:28	HH	1	N	28	hunt	270	female
2	21/09/2023	14:34	KT	2	circle ENE	60		900	
2	21/09/2023	18:12	PG	22	SW	135		300	
3	29/09/2023	07:17	KT	1	ENE	11		720	
3	29/09/2023	07:42	GI	1	N	38		70	adult male, flew between woods
3	29/09/2023	07:46	KT	1		11		210	
3	29/09/2023	08:15	KT	1		30	hunt	3900	
3	29/09/2023	09:27	KT	1		35		180	until VP end
3	29/09/2023	10:23	KT	1		15		360	
3	29/09/2023	11:02	KT	1		6		300	
3	29/09/2023	11:19	KT	2	NW	10		150	
3	29/09/2023	11:57	KT	1		6		90	
3	29/09/2023	12:06	KT	2		30		660	
3	29/09/2023	12:33	KT	5		175		300	up to 5 on view
3	29/09/2023	12:35	KT	1	S	11	hunt	1200	
3	29/09/2023	12:58	KT	1		6		120	until VP end
2	04/10/2023	09:00	KT	2		11	hunt	420	
2	04/10/2023	09:29	KT	2		8	hunt	70	
2	04/10/2023	10:27	KT	2		23		360	
2	04/10/2023	10:36	GI	1	W	33		20	
2	04/10/2023	10:40	KT	1		105		600	
2	04/10/2023	11:58	KT	1		13		120	until VP end
3	04/10/2023	12:30	KT	2		16		2160	from VP start
3	04/10/2023	12:49	HY	1	S	8		85	juv Hobby
3	04/10/2023	13:39	KT	2		11		1260	until VP end
3	04/10/2023	13:44	KT	1		100		960	until VP end
3	04/10/2023	13:45	KT	3	NW	50		420	
3	04/10/2023	13:58	KT	1		20		120	until VP end
3	04/10/2023	16:10	KT	3	ESE	25		420	from VP start
3	04/10/2023	16:29	MR	1	NW	28	migrant	160	1cy
3	04/10/2023	17:06	KT	1	NW	20		70	
2	05/10/2023	08:49	KT	1	circle E	50		360	
2	05/10/2023	09:21	KT	1		50		90	
3	13/10/2023	12:34	KT	1		16	hunt	960	
3	13/10/2023	13:22	KT	1	NW	15		35	
3	13/10/2023	14:04	KT	1		11	hunt	210	
3	13/10/2023	14:42	KT	1		8		600	
3	13/10/2023	14:44	KT	2		16		330	
2	19/10/2023	10:19	WS	4	NW	23		140	a adults, 2 1cy flew off
2	19/10/2023	11:19	KT	1		16	hunt	190	
2	19/10/2023	11:39	KT	1		11	hunt	360	
2	19/10/2023	15:42	KT	1	NW	13		70	
2	19/10/2023	15:52	KT	1		8		70	
2	19/10/2023	15:58	HH	1	S	21		170	male
2	19/10/2023	16:02	MR	1	ESE	18		40	female/juv (distant_