

## Technical Appendix 8.2

### Bloch Wind Farm: Breeding Bird Survey 2022



## Report to Renewable Energy Systems Ltd

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## TABLE OF CONTENTS

<b>TABLE OF CONTENTS.....</b>	<b>2</b>
<b>INTRODUCTION .....</b>	<b>4</b>
<b>STUDY AREA .....</b>	<b>4</b>
<b>BREEDING BIRD SURVEY METHODS .....</b>	<b>4</b>
<b>CORE BREEDING BIRD SURVEY .....</b>	<b>4</b>
<b>RAPTOR BREEDING SURVEYS (WIDER SURVEY AREA).....</b>	<b>5</b>
<b>BLACK GROUSE SURVEY.....</b>	<b>5</b>
<b>VANTAGE POINT SURVEYS .....</b>	<b>6</b>
<b>BREEDING BIRD SURVEYS 2021: RESULTS.....</b>	<b>7</b>
<b>CORE BREEDING BIRD SURVEY .....</b>	<b>7</b>
<b>BLACK GROUSE SURVEY RESULTS.....</b>	<b>9</b>
<b>RAPTOR SURVEY RESULTS.....</b>	<b>9</b>
<b>VANTAGE POINT SURVEY RESULTS .....</b>	<b>9</b>
<b>CONSERVATION EVALUATION OF BREEDING BIRD POPULATIONS .....</b>	<b>11</b>
<b>CONCLUSIONS.....</b>	<b>14</b>
<b>REFERENCES.....</b>	<b>15</b>

## List of Figures

- Figure 1. Breeding Bird Survey Areas, 2022.
- Figure 2. Distribution of Breeding Waders, 2022.
- Figure 3. Distribution of Breeding Woodpigeon, 2022.
- Figure 4. Distribution of Breeding Skylark, 2022.
- Figure 5. Distribution of Breeding Meadow Pipit, 2022.
- Figure 6. Distribution of Breeding Wren, 2022.
- Figure 7. Distribution of Breeding Dunnock, 2022.
- Figure 8. Distribution of Breeding Song Thrush, 2022.
- Figure 9. Distribution of Breeding Mistle Thrush, 2022.
- Figure 10. Distribution of Breeding Sedge Warbler, 2022.
- Figure 11. Distribution of Breeding Willow Warbler, 2022.
- Figure 12. Distribution of Breeding Siskin, 2022.
- Figure 13. Distribution of Breeding Linnet, 2022.

Figure 14. Distribution of Breeding Lesser Redpoll, 2022.

Figure 15. Distribution of Breeding Reed Bunting, 2022.

Figure 16. Distribution of Other Breeding Species, 2022.

Figure 17. Oystercatcher Flight Activity, 2022.

Figure 18. Lapwing Flight Activity, 2022.

Figure 19. Snipe Flight Activity, 2021.

Figure 20. Curlew Flight Activity, 2021.

Figure 21. Scarce Raptor Flight Activity, 2021.

## Appendices

Appendix 1 – Vantage Point Survey Data

## BLOCH WIND FARM: BREEDING BIRD SURVEYS 2021

### Introduction

1. This report presents the results of ornithological work carried out for the proposed Bloch Wind Farm, Dumfries and Galloway. This comprised a second years' breeding bird survey to provide another breeding 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 were designed to take into account NatureScot (SNH 2017) guidance on bird surveys for wind farms. The surveys were undertaken by Tom Lowe and Stuart Piner, both highly experienced bird surveyors.

### Study Area

3. The proposed development is located 5.5km south-west of Langholm, in Dumfries and Galloway. The breeding bird survey areas were chosen to include all areas within the possible zone of ornithological influence of the proposed wind farm. This included the wind farm site, plus a 500m buffer (the core survey area, following NatureScot guidance, SNH 2017) and a 2km buffer for the key species surveys (the wider survey area), where access was possible and where there was potentially suitable habitat. The extents of these areas are shown in Figure 1 of this report. It was not possible to get full access to the buffer zone around the site, nor to parts of the site itself during April and May (when sensitivities due to lambing restricted access). The areas affected by these restrictions are shown in Figure 2. The main core survey area covered a total area of 15.7km<sup>2</sup> and the wider survey area 56.1km<sup>2</sup>. It comprised predominantly upland moorland habitat, currently used mainly for grazing sheep, with the original Solwaybank wind farm adjacent to the west (within an area of extensive conifer plantation).
4. The site lies mainly within the '*Border Hills*' NatureScot Natural Heritage Zone (NHZ20), though the southern edge of the survey area is within the '*West Southern Uplands and Inner Solway*' (NHZ19).

### Breeding Bird Survey Methods

5. The aim of the breeding season fieldwork was to obtain data on the importance of the proposed wind farm site and its surrounds for breeding birds, and on the flight lines of key target species. They included moorland bird surveys, raptor surveys and black grouse surveys.

#### Core breeding bird survey

6. The main breeding bird walkover survey followed the standard moorland survey method (Brown and Shepherd 1993) but with two additional visits as recommended in current NatureScot guidance (SNH 2017). They commenced in April 2022 and

continued through to July, and were done between 8:30 hours and 18:00 hours. The survey dates were 11/14 April, 10/11 May, 13/14 June, and 6/7 July 2022. These surveys covered all of the open (i.e. non-forested) habitat within a buffer zone of 500m around the developable area where access/viewing was possible (Figure 1). Access was improved on the previous surveys in 2021, with no restrictions affecting the breeding bird survey coverage/results.

7. All bird locations and behaviour were mapped to 1:10,000 scale, using the standard British Trust for Ornithology (BTO) Common Birds Census notation. All species were recorded. In addition, the survey effort per unit area was standardised to make the surveys as repeatable as possible, recording systematically for approximately 2 hours per km<sup>2</sup>. A route was chosen to ensure that all parts of the study area were covered to within about 100m of the observer, where access was possible. The survey route was plotted onto the survey map as it was carried out.
8. The surveys avoided strong winds, heavy rain, fog and low cloud. Birds were located by walking, listening and scanning by eye and with binoculars. Standard BTO notation will be used to record the birds' activities; singing, calling, carrying nest material, nests or young found, repetitively alarmed adults, disturbance displaying, carrying food or in territorial dispute.
9. The survey data were analysed to determine spatially distinct clusters of records, equivalent to breeding territories (following Brown and Shepherd 1993), with the number of such territories used to calculate the breeding population for each species (Gilbert *et al.* 1998). A record in potentially suitable breeding habitat on a single visit was considered sufficient to indicate a potential breeding attempt.

### Raptor breeding surveys (wider survey area)

10. As the survey area was considered likely, from the results of an initial desk study and the site location, to be used by a range of scarce raptors, raptor surveys of a 2km buffer zone around the developable area were undertaken during April-August 2022. Raptor surveys comprised walkovers where access was allowed, supplemented by a series of mini-VPs (shorter watches from additional VPs) to cover other areas, to detect displaying or nesting behaviour during the breeding season of raptor species in accordance with methods described in Gilbert *et al.* (1998) and Hardey *et al.* (2013). Surveys recorded all Schedule 1 and Annex I raptor species including those species for which evidence of breeding has previously been recorded in the vicinity (including goshawk, red kite, peregrine, barn owl and short-eared owl) and where potentially suitable breeding habitat for these species was present. This included surveys visits, undertaken on 12-14 April, 4/5 and 10 May, 13-16 June, 6-8 July and 12 August 2022.

### Black Grouse Survey

11. Black grouse surveys were undertaken following the methods outlined in Gilbert *et al.* (1998). All suitable black grouse habitat within the site boundary and a 2km buffer was surveyed (where access was possible – see above). Surveys were carried out on 12/13 April and 10 May. Areas of suitable habitat to which access was not possible were scanned with binoculars from the site boundary, from publicly accessible locations and from suitable vantage points within the site. A three-visit survey

protocol was followed (though additional data were also collected during other surveys):

- Visit 1: site visit to assess habitat for black grouse suitability;
- Visit 2: areas of suitable habitat with the potential to support lekking black grouse were visited twice on different mornings to establish presence/absence; and
- Visit 3: any locations where black grouse were recorded as present during the second visit were revisited in order to provide an accurate count of the number of lekking birds present. The survey was undertaken one hour prior to dawn until one hour after dawn.

### Vantage point surveys

12. 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 included all EU Birds Directive Annex 1 species, Wildlife & Countryside Act (1981) Schedule 1 species and Red-listed birds of Conservation Concern (Eaton *et al.* 2015), as per NatureScot (SNH 2017).
13. 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.
14. Two vantage points were used to cover the potential wind farm site. The computer-generated viewsheds (using Global Mapper v21) are shown in Figure 1. For each VP, 36 hours' VP surveys during the breeding season from each VP were carried out (as set out in NatureScot guidance, SNH 2017), spread evenly across the breeding season.
15. 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).
16. 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 recorded. To estimate flight height as accurately as possible available reference structures were used. Heights were estimated as accurately as possible recorded as a raw estimate, rather than being summarised to height classes. Below 10m estimates were made to 1m, between 10 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.

## Breeding Bird Surveys 2022: Results

### Core breeding bird survey

17. The breeding bird populations found within the core breeding bird survey area during the 2022 breeding bird surveys are summarised in Table 1. The results from the previous year are also given for comparison (though it should be noted that that access was restricted to part of the survey area during April and May 2021, so the numbers that year should be treated as minimum values as some early breeding birds and birds that failed in the first part of the breeding season may have been missed).

**Table 1. Breeding bird populations in the Bloch wind farm core survey area during April-July 2021 and 2022.**

Species	Estimated numbers of breeding pairs 2021	Estimated numbers of breeding pairs 2022
Greylag Goose	0	2
Mallard	6	4
Red Grouse	0	6
Grey Partridge	0	2
Pheasant	8	5
Buzzard	9	6
Kestrel	1	1
Oystercatcher	5	5
Lapwing	3	8
Snipe	9	6
Curlew	7	7
Common Sandpiper	0	1
Feral Pigeon	1	3
Stock Dove	2	4
Woodpigeon	52	57
Cuckoo	7	6
Great Spotted Woodpecker	4	2
Kingfisher	0	1
Skylark	290	411
Sand Martin	12	17
Swallow	21	26
House Martin	5	3
Tree Pipit	3	2
Meadow Pipit	1022	1181
Grey Wagtail	7	8
Pied Wagtail	25	32
Dipper	2	2
Wren	59	90
Dunnock	9	11
Robin	24	33
Redstart	5	2
Whinchat	6	4
Stonechat	27	47
Wheatear	3	4
Blackbird	18	26
Song Thrush	17	38
Mistle Thrush	13	7
Grasshopper Warbler	5	9
Sedge Warbler	7	15
Blackcap	4	5
Whitethroat	2	2

Species	Estimated numbers of breeding pairs 2021	Estimated numbers of breeding pairs 2022
Chiffchaff	7	9
Willow Warbler	73	91
Goldcrest	9	12
Spotted Flycatcher	3	0
Pied Flycatcher	1	0
Long-tailed Tit	3	2
Blue Tit	8	10
Great Tit	5	14
Coal Tit	22	15
Treecreeper	1	0
Jay	0	4
Jackdaw	18	74
Carrion Crow	32	35
Raven	2	3
Starling	9	8
House Sparrow	5	9
Chaffinch	58	79
Goldfinch	10	8
Siskin	29	17
Linnet	20	20
Lesser Redpoll	37	84
Common Crossbill	0	2
Bullfinch	0	5
Reed Bunting	52	76

18. The distributions of the breeding birds of conservation importance within the survey area in 2022 are shown on Figures 2 to 14 of this report. The more abundant species (i.e. 10 or more breeding pairs) of conservation interest have been presented separately for clarity.
- **Breeding waders** (Figure 2) – the distributions of breeding oystercatcher, lapwing, snipe and curlew is shown in Figure 2. Higher densities of these species were found in the central part around Bloch Farm (particularly oystercatcher and lapwing), though curlew and snipe were more widely distributed across the open habitats.
  - **Woodpigeon** (Figure 3) – were widely scattered over the survey area but were found mainly on the lower wooded areas around the fringes of the site.
  - **Skylarks** (Figure 4) and **Meadow Pipit** (Figure 5) were both abundant over all the open moorland habitat within the survey area.
  - **Wren** (Figure 6) were abundant on the woodland habitats around the site, found in most areas where there were any trees/scrub.
  - **Dunnoek** (Figure 7) were found mostly in the woodland habitat on the fringes of the survey area.
  - **Song Thrush**, (Figure 8) and **Mistle Thrush** (Figure 9) were also found predominantly associated with wooded habitats,
  - **Sedge Warbler** (Figure 10) were found mainly alongs the main streams in the southern part of the site, though also at several locations along the Bigholms Burn on the northern edge.



- **Willow Warblers** (Figure 11) and were all widely distributed but largely restricted to the woodland habitats on the edge of the survey area.
  - **Siskin** (Figure 12) and **Lesser redpoll** (Figure 14) was another mainly woodland species found mainly on the fringes of the survey area.
  - **Linnet** (Figure 13) was most frequently recorded in the lower areas around Bloch Farm rather than within the main moorland areas, associated mainly with scrub habitats.
  - **Reed bunting** (Figure 15) were widely distributed across most of the open habitats across the survey area.
19. Other less abundant species of conservation importance (Figure 16) were found mainly in the fringes of the survey area and mostly associated with woodland habitats and around Bloch farm, with no important concentrations noted and few within the proposed wind farm site itself.
20. Additional species seen during the breeding bird surveys but not showing any evidence of breeding within the survey area included (peak counts): grey heron (1), golden plover (19 – migrant birds seen in April in both years), black-headed gull (1), lesser black-backed gull (21), great black-backed gull (1), swift (14), redwing (2), fieldfare (46 – migrant birds seen in April in both years) and rook (54).

### Black Grouse survey results

21. There were no records of black grouse during any of the specific surveys for this species or any other surveys.

### Raptor survey results

22. **Hen Harrier** – there were three records of adult females over-flying the site in July and August 2022 during the VP surveys, and an adult female preening on a fencepost for 30 minutes then heading off north-east on the north-eastern edge of the core survey area on 12/8/22 during the wider area surveys.
23. **Goshawk** – a single was seen overflying the central part of the core survey area during the VP surveys on 14/6/22.
24. **Red Kite** – singles seen over-flying during the VP surveys on 4/5/22 and 10/8/22.
25. **Osprey** – a single juvenile was seen migrating south over the site during the wider area surveys on 12/8/22.
26. **Merlin** - a single was seen overflying the central part of the core survey area during the VP surveys on 8/7/22.
27. No evidence was found that any of these species were breeding within the core or the wider survey areas.

### Vantage Point Survey Results

28. The rates of bird flight movement observed across the survey area during the vantage point surveys are summarised in Table 2. This gives the flight rate per hour recorded in

each month and the total number of flights recorded. The results from the previous breeding season in 2021 are given in Table 3 for comparison.

29. Table 2 also gives the percentage of flights of each species that were recorded at rotor height (taking rotor height conservatively - to allow for errors in estimation and uncertainty as to turbine specification at this stage - as between 21m and 250m above ground level).

**Table 2a. Bird flight rates recorded over the Bloch Wind Farm survey area during April-August 2022 vantage point surveys. N = 36 hours total observation from each of the two VPs.**

Species	Flight rate (birds/hour)					Total number of birds overflying	% flights at rotor height
	April	May	June	July	Aug		
Mallard	1.57	0.57	0	0	0	15	33%
Cormorant	0	0	0	0	0.57	4	100%
Red Kite	0	0.14	0	0	0.14	2	100%
Hen Harrier	0	0	0	0.13	0.29	3	33%
Goshawk	0	0	0.14	0	0	1	100%
Sparrowhawk	0	0	0	0	0.43	3	67%
Buzzard	0.86	2.71	4.29	3.25	2.71	100	90%
Kestrel	0	0.14	0.57	0	0.86	11	18%
Merlin	0	0	0	0.13	0	1	0%
Oystercatcher	0.29	0	1.71	2.13	0	31	21%
Lapwing	3.86	1.71	3.29	28.88	0.86	299	10%
Snipe	0.57	1.14	0	0	0	12	60%
Curlew	3.00	2.57	2.71	0.88	0	65	31%
Common Gull	0	0	0	0	2.00	14	33%
Lesser Black-backed Gull	2.71	1.71	0.57	2.88	5.43	96	78%
Herring Gull	0	0	0.14	0.25	0.57	7	100%
Great Black-backed Gull	1.71	0.57	0	0.38	0	19	54%

**Table 2b. Bird flight rates recorded over the Bloch Wind Farm survey area during April-August 2021 vantage point surveys. N = 36 hours total observation from each of the two VPs.**

Species	Flight rate (birds/hour)					Total number of birds overflying	% flights at rotor height
	April	May	June	July	Aug		
Greylag Goose	0.47	0	0	0	0	7	25%
Mallard	0.13	0.13	0	0	0	4	33%
Goosander	0	0	0	0	0.07	1	100%
Grey Heron	0	0	0.20	0	0	3	100%
Hen Harrier	0.07	0	0	0	0	1	100%
Goshawk	0	0	0	0.07	0.07	2	50%
Buzzard	0.47	1.53	1.93	1.04	0.43	79	67%
Osprey	0	0	0	0.07	0	1	100%
Kestrel	0.13	0.13	0.67	0.74	0	24	57%
Peregrine	0	0	0.13	0	0	2	0%
Oystercatcher	0.33	0.13	0.40	0.07	0	14	11%
Lapwing	0.40	1.27	0	0.89	3.14	81	8%
Snipe	0	0.13	0	0.37	0.21	10	57%
Curlew	1.87	0.87	0.53	0	0	49	31%

Species	Flight rate (birds/hour)					Total number of birds overflying	% flights at rotor height
	April	May	June	July	Aug		
Common Gull	0	0	0	0.07	0	1	100%
Lesser Black-backed Gull	1.47	1.33	1.47	1.41	0.14	85	63%
Herring Gull	0.13	0	0.07	0	0	3	67%
Great Black-backed Gull	0	0.13	0	0.22	0.14	7	86%

30. Key species' flight lines are mapped in Figures 15-19. Oystercatcher flight activity (Figure 15) was broadly similar to the distribution of the breeding birds, concentrated mainly around the central part of the survey area near Bloch Farm.
31. Lapwing flights (Figure 16) and snipe flights (Figure 17) were also concentrated around their main breeding areas in the central part of the survey area.
32. Curlew flight activity was widespread across most of the survey area, reflecting their abundance and their wide breeding distribution (Figure 18).
33. Scarce raptors (Figure 19) (red kite, hen harrier, osprey, goshawk and merlin) were only seen very infrequently, and no particular concentrations of activity were apparent.

## Conservation Evaluation of Breeding Bird Populations

34. The conservation value of the breeding bird populations was determined using the criteria specified in Table 3 (from Percival 2007) and is summarised in Table 4. 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 (Frost *et al.* 2021). 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 (>1%) in a NHZ context (Wilson *et al.* 2015). 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 (Frost *et al.* 2021) 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, NERC Act Section 41 priority species and Scottish BAP species were all considered in the evaluation process.

**Table 3. 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 (>1% NHZ) or distributional context. NERC Act Section 41 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).

**Table 4. Conservation evaluation of the breeding bird populations in the core Bloch Wind Farm survey area.**

Species	Peak breeding pairs 2021/22	>1% NHZ	EU Birds Dir Ann 1	W and C Act Sch 1	Red [R]/ Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
<i>Breeding Species:</i>								
Greylag Goose	2				A			Low
Mallard	6				A			Low
Red Grouse <sup>1</sup>	6					ü		Medium
Grey Partridge	2				R	ü	ü	Medium
Pheasant	8							Nil
Buzzard <sup>2</sup>	9							Nil
Kestrel	1				A		ü	Low
Oystercatcher	5				A			Low
Lapwing	8				R	ü	ü	Medium
Snipe <sup>2</sup>	9				A			Low
Curlew <sup>2</sup>	7				R	ü	ü	Medium
Common Sandpiper	1				A			Low
Feral Pigeon	3							Nil
Stock Dove	4				A			Low
Woodpigeon	57				A			Low
Cuckoo	7				R	ü	ü	Medium
Great Spotted Woodpecker	4							Nil
Kingfisher	1		ü	ü			ü	High
Skylark	411				R	ü	ü	Medium
Sand Martin	17							
Swallow	26							
House Martin	5				R			Low
Tree Pipit	3				R	ü	ü	Medium
Meadow Pipit	1181				A			Low
Grey Wagtail <sup>2</sup>	8				A			Low
Pied Wagtail	32							Nil
Dipper <sup>2.5</sup>	2				A			Low
Wren	90				A			Low

Species	Peak breeding pairs 2021/22	>1% NHZ	EU Birds Dir Ann 1	W and C Act Sch 1	Red [R]/ Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Dunnock	11				A	ü		Medium
Robin	33							Nil
Redstart	5							Nil
Whinchat <sup>2</sup>	6				R			Low
Stonechat <sup>2</sup>	47							Nil
Wheatear <sup>1</sup>	4				A			Low
Blackbird	26							Nil
Song Thrush	38				A	ü	ü	Medium
Mistle Thrush	13				R			Low
Grasshopper Warbler	9				R	ü	ü	Medium
Sedge Warbler	15				A			Low
Blackcap	5							Nil
Whitethroat	2							Nil
Chiffchaff	9							Nil
Willow Warbler	91				A			Low
Goldcrest	12							Nil
Spotted Flycatcher	3				R	ü	ü	Medium
Pied Flycatcher	1				A			Low
Long-tailed Tit	3							Nil
Blue Tit	10							Nil
Great Tit	14							Nil
Coal Tit	22							Nil
Treecreeper	1							Nil
Jay	4							Nil
Jackdaw	74							Nil
Carrion Crow	35							Nil
Raven <sup>3</sup>	3							Nil
Starling	9				R	ü		Medium
House Sparrow	9				R	ü	ü	Medium
Chaffinch	79							Nil
Goldfinch	10							Nil
Siskin	29						ü	Low
Linnet	20				R	ü	ü	Medium
Lesser Redpoll	84					ü	ü	Medium
Common Crossbill	2			ü				High
Bullfinch	5				A	ü	ü	Medium
Reed Bunting	76				A	ü	ü	Medium
<i>Additional non-breeding species:</i>	<i>Peak count</i>							
Grey Heron	1							Nil
Cormorant	4							Nil
Red Kite	1		ü	ü			ü	High
Hen Harrier	1		ü	ü	R		ü	High
Goshawk	1			ü				High
Osprey	1		ü	ü	A		ü	High
Merlin	1		ü	ü	R		ü	High
Peregrine	1		ü	ü			ü	High
Golden Plover	19		ü				ü	High
Black-headed Gull	1				A			Low
Common Gull	1				A			Low

Species	Peak breeding pairs 2021/22	>1% NHZ	EU Birds Dir Ann 1	W and C Act Sch 1	Red [R]/ Amber [A] List	UK priority sp	Scottish BAP sp	Conservation Value
Lesser Black-backed Gull	21				A			Low
Herring Gull	2				R	ü	ü	Medium
Great Black-backed Gull	3				A			Low
Swift	14				R		ü	Low
Redwing	2				A		ü	Low
Fieldfare	46				R			Low

Note: superscripts indicate contribution to the JNCC breeding bird assemblage score for the main habitat within the survey area, 'Upland moorland and grassland without waterbodies'.

35. Two high value species was recorded breeding within the core breeding bird survey area, kingfisher (one pair on the Bigholms Burn) and common crossbill (two pairs in coniferous plantations in the northern and central parts of the survey area).
36. Seventeen breeding species were classed as medium conservation value: red grouse, grey partridge, lapwing, curlew, cuckoo, skylark, tree pipit, dunnock, song thrush, grasshopper warbler, spotted flycatcher, starling, house sparrow, linnet, lesser redpoll, bullfinch and reed bunting. All were classed as medium value for their listing as NERC Act Section 41 priority species (UK Biodiversity Action Plan priority species).
37. A further twenty-one breeding species were classed as low sensitivity, through their listing on RSPB *et al.*'s (Stanbury *et al.* 2021) amber lists of birds of conservation concern and/or the Scottish Biodiversity List.
38. The overall conservation value of the breeding bird community, measured from the core survey data as the breeding bird assemblage score, was 19.5. This is below the threshold for national importance (27) but above the threshold for regional importance (14) for the main habitat within the survey area, 'Upland moorland and grassland without water bodies' (Drewitt *et al.* 2020). The core survey area therefore supports a regionally important breeding bird community.

## Conclusions

39. The 2022 breeding bird populations recorded in 2022 were similar to those found in 2021. The survey area supports a range of upland breeding species and a regionally important assemblage.
40. Two species specially protected from disturbance under Schedule 1 of the 1981 Wildlife and Countryside Act found breeding in the core survey area, kingfisher (1 pair) and common crossbill (2 pairs).
41. The main target species at risk of collision would be the breeding waders using the site, particularly lapwing and curlew (those these did not occur at particularly high density). Raptor flight activity over the site at rotor height (other than buzzard) occurred at only a very low level.
42. Careful site design and appropriate mitigation where necessary should enable any potentially significant effects on these species to be avoided. No spatial constraints were identified within the current site boundary in relation to breeding birds.

43. Given the widespread distribution of curlew across the site, it will be difficult to avoid this species in the design process, so alternative mitigation measures, e.g. habitat enhancement away from the wind farm, may be required.

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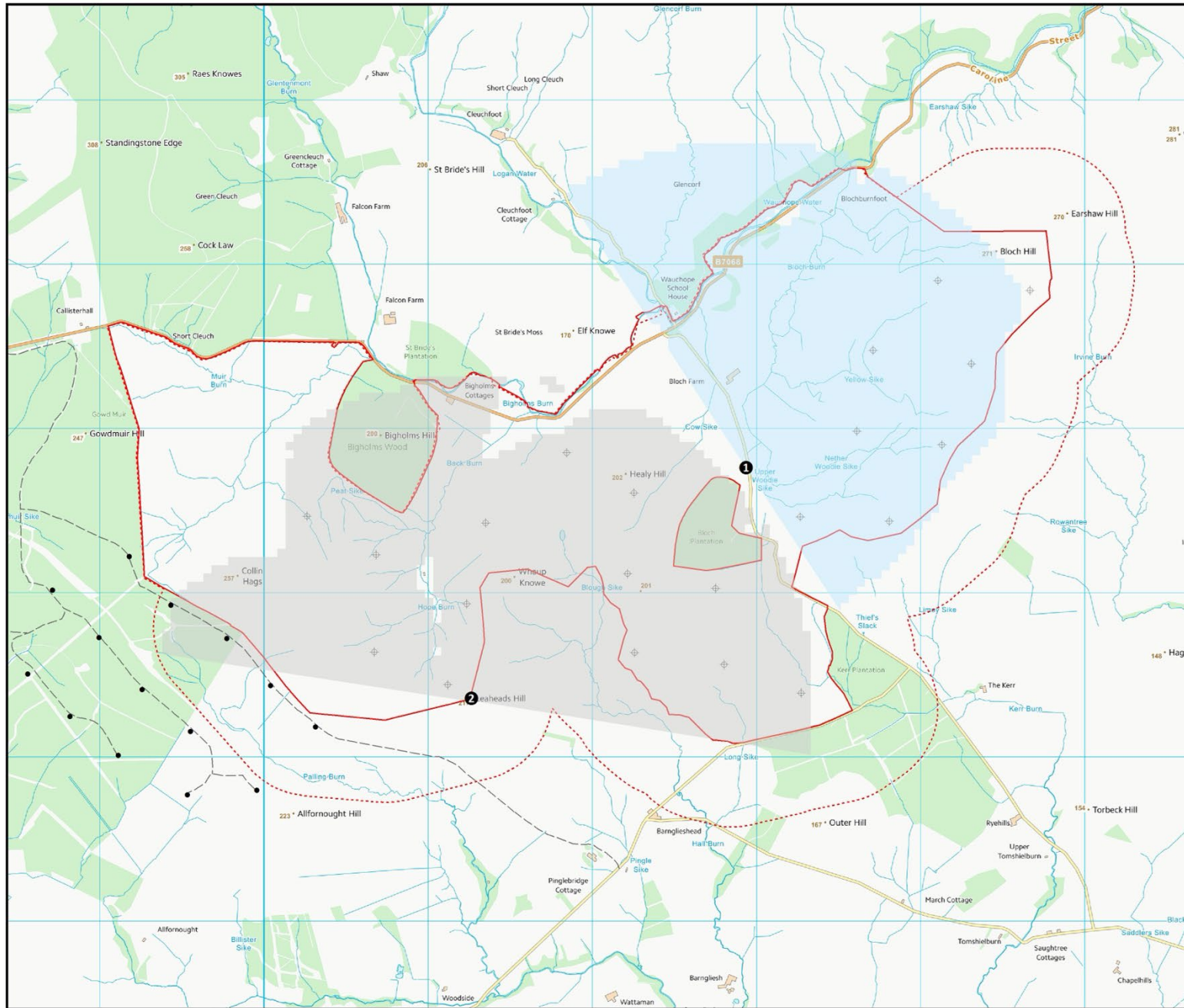
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 1  
Breeding Bird  
Survey Areas**

- KEY:**
- Site Boundary
  - Vantage Point Locations
  - Core Breeding Bird Survey Area
  - VP1 viewed
  - VP2 Viewshed
  - Proposed turbines
  - Solwaybank wind farm tracks
  - Solwaybank turbines (operational)



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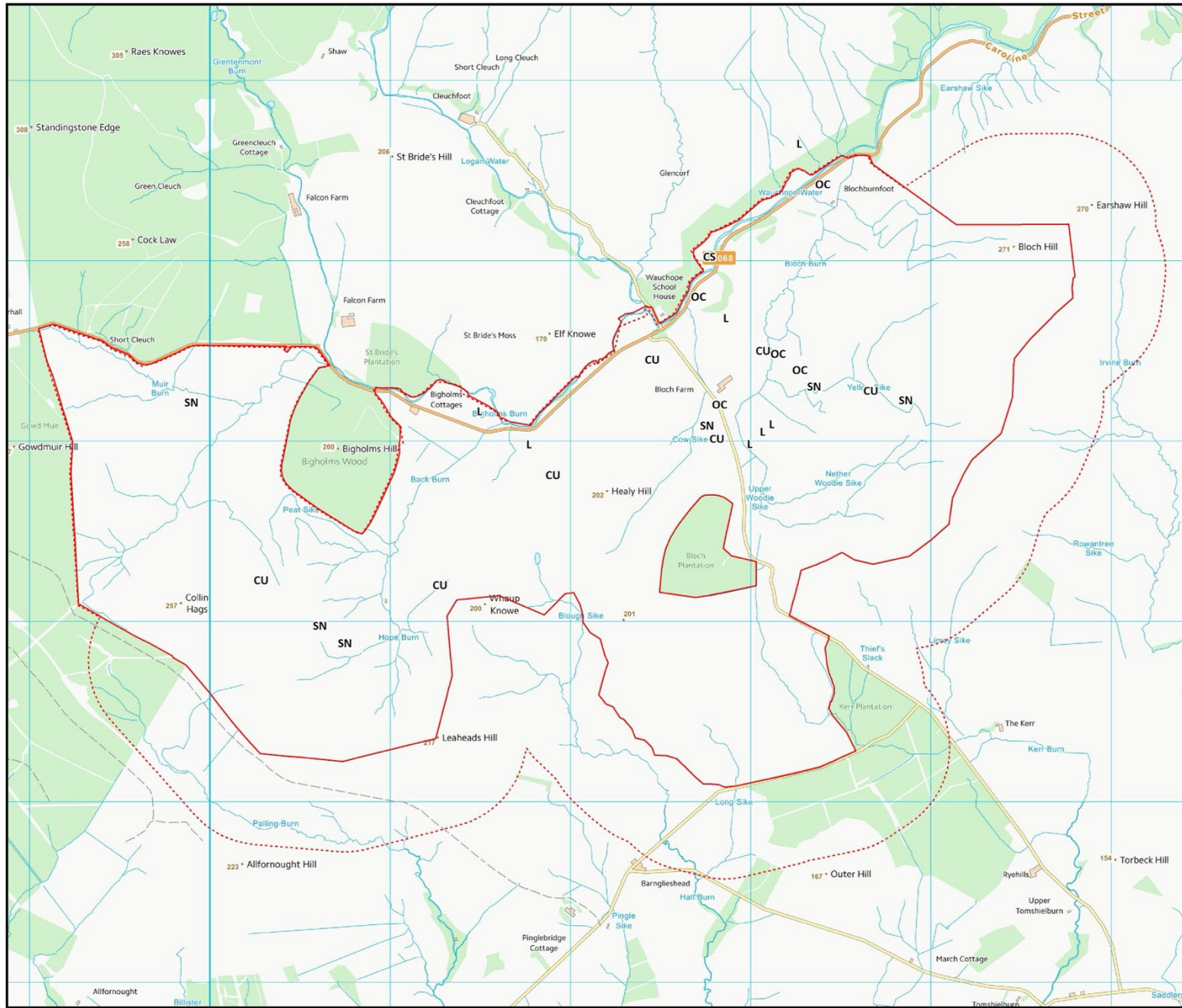
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**BREEDING BIRD  
SURVEYS 2022**

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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 2  
Distribution of Breeding  
Waders**

**KEY:**

- Site Boundary
  - Core Breeding Bird Survey Area
  - Solwaybank wind farm tracks
- Breeding waders:**
- CU - Curlew
  - CS - Common Sandpiper
  - L - Lapwing
  - OC - Oystercatcher
  - SN - Snipe



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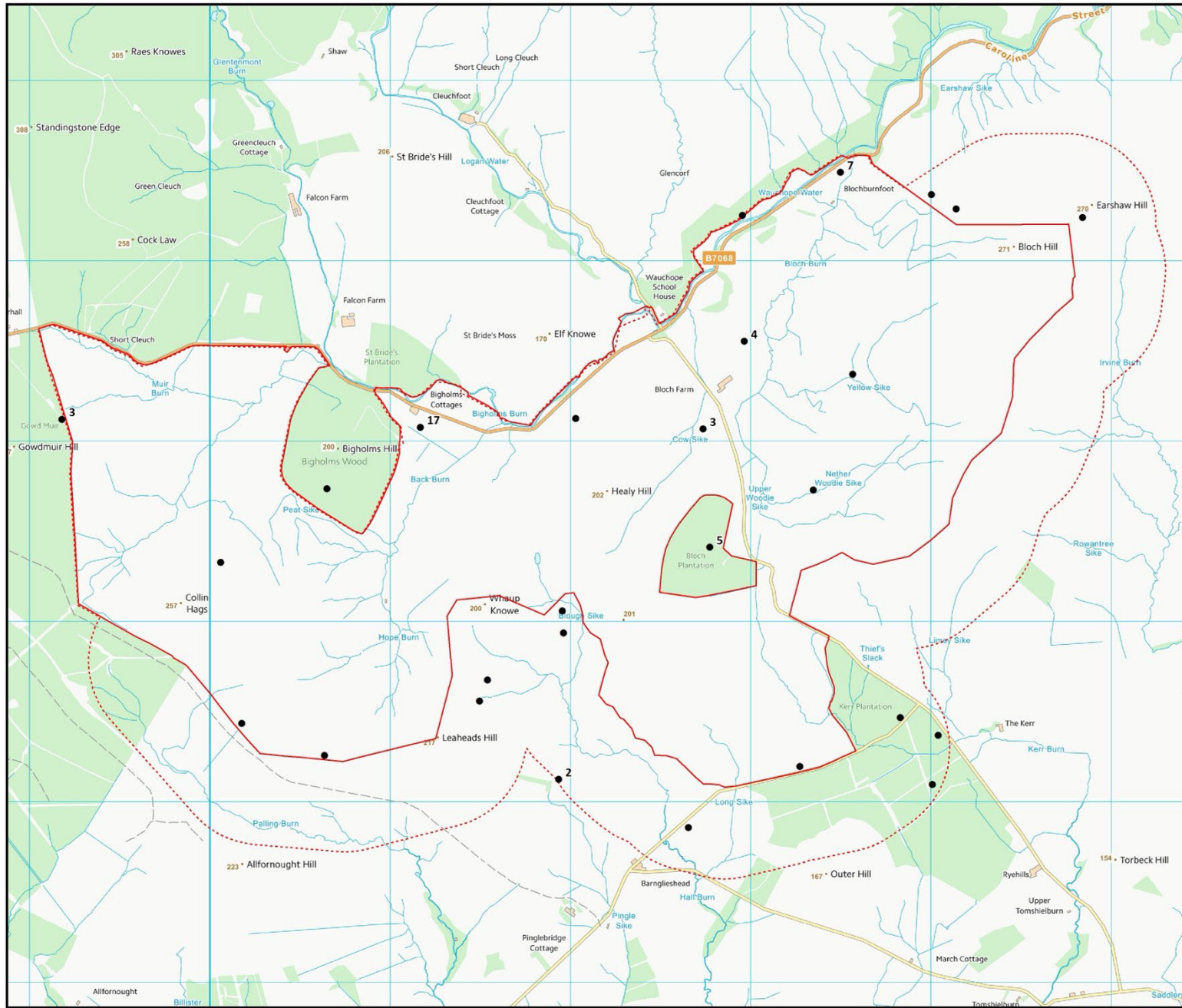
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 3  
Distribution of Breeding  
Woodpigeon**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations
- Numbers = multiple pairs at one location



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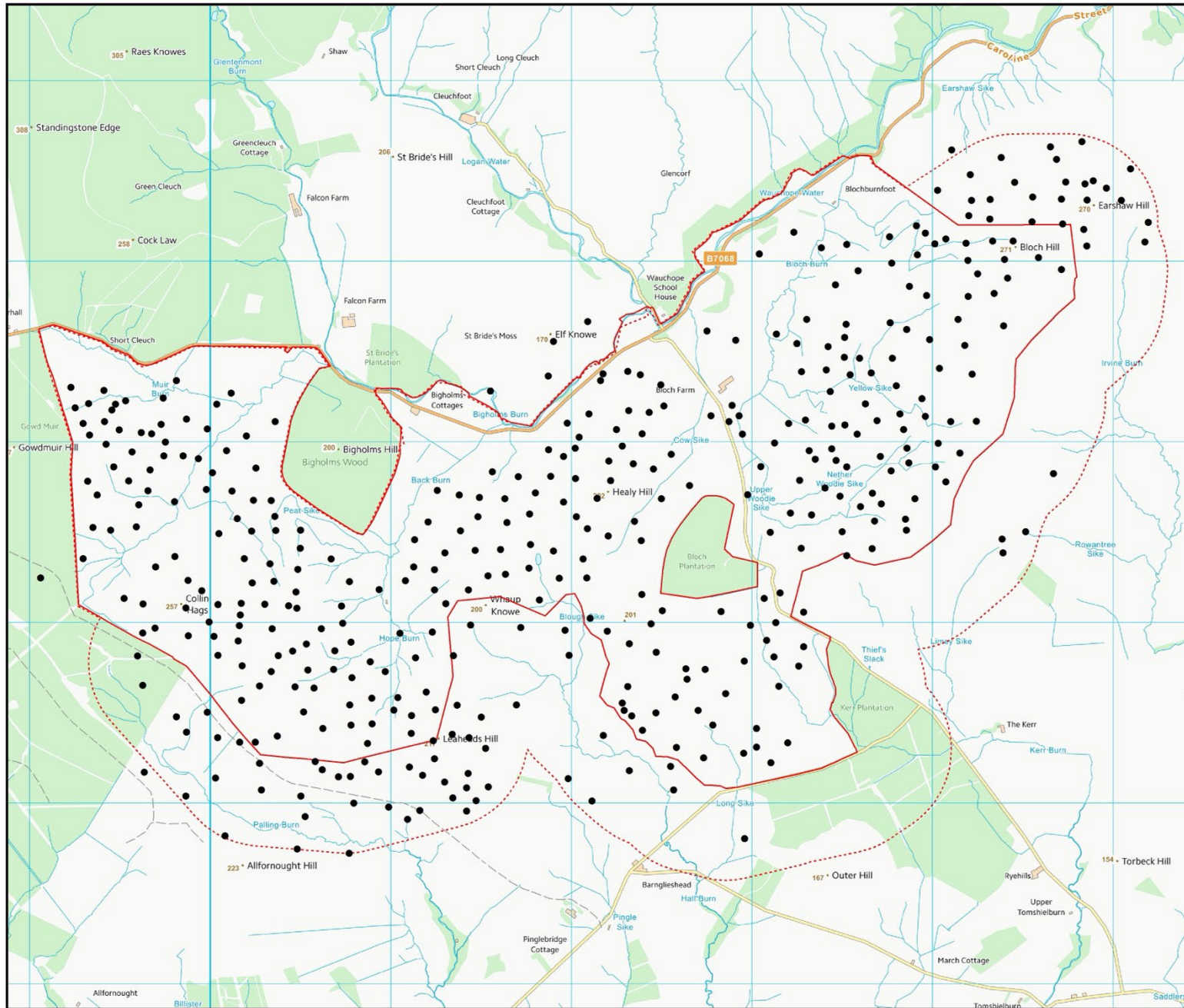
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 4  
Distribution of Breeding  
Skylark**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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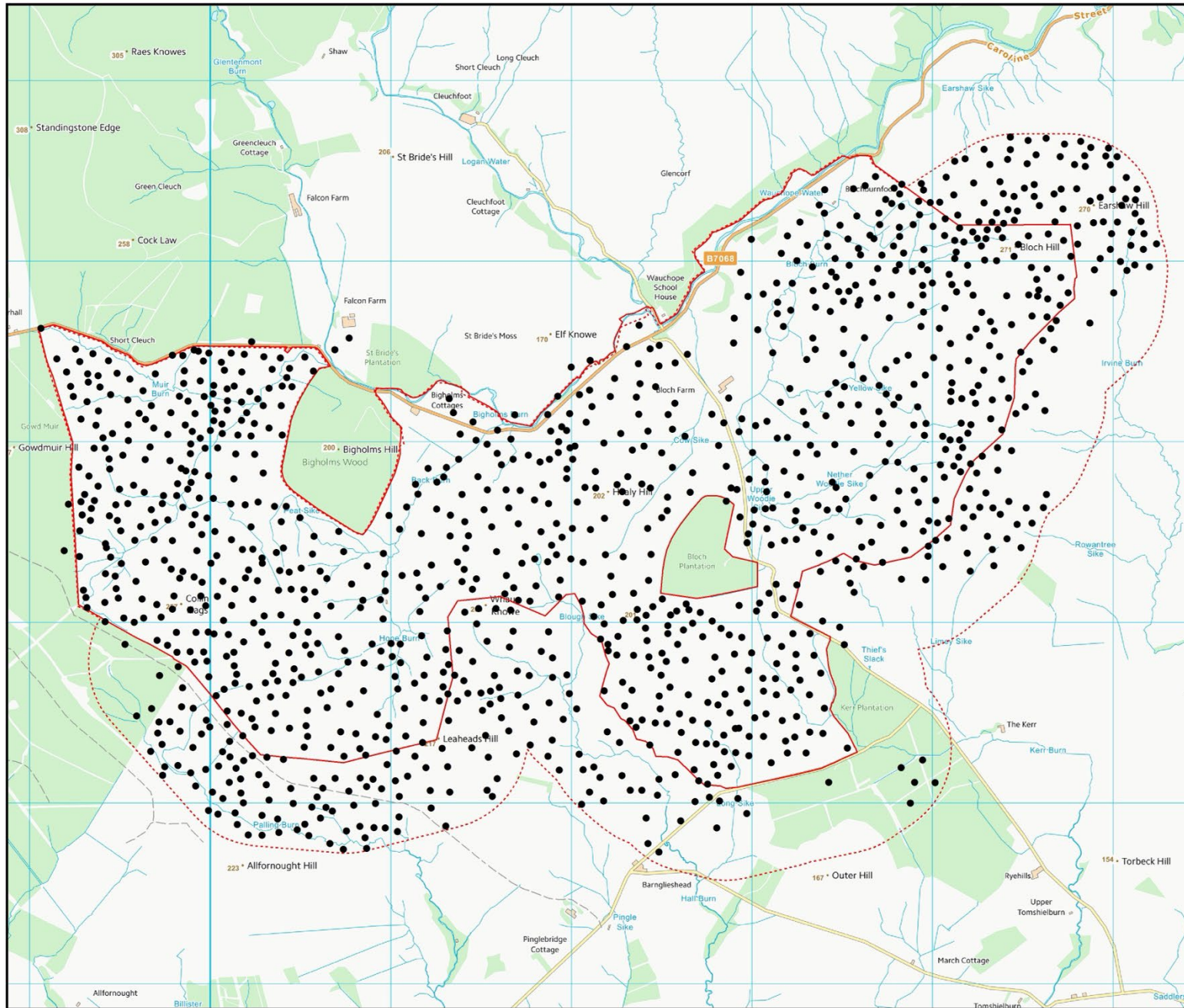
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 5  
Distribution of Breeding  
Meadow Pipit**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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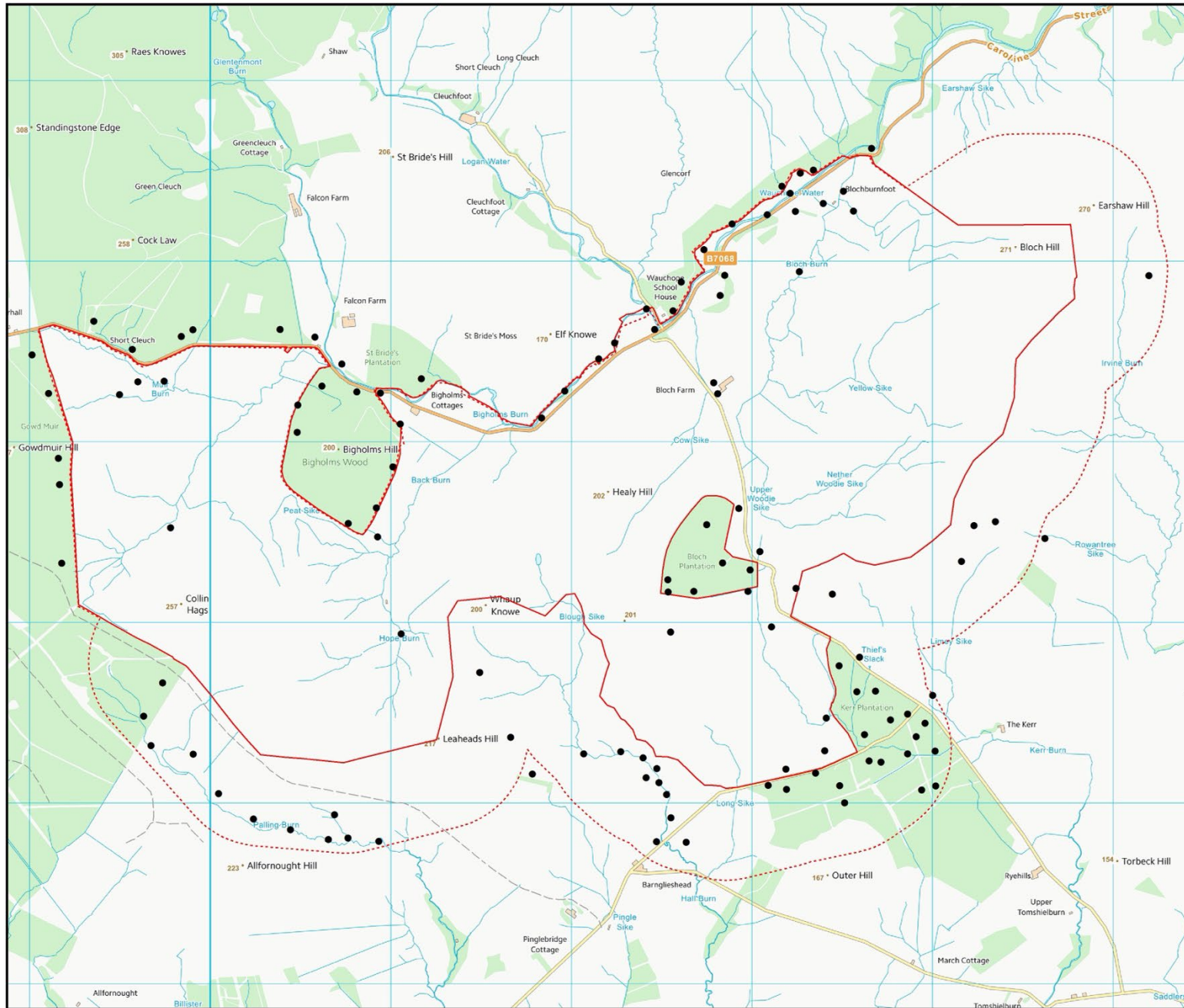
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 6  
Distribution of Breeding  
Wren**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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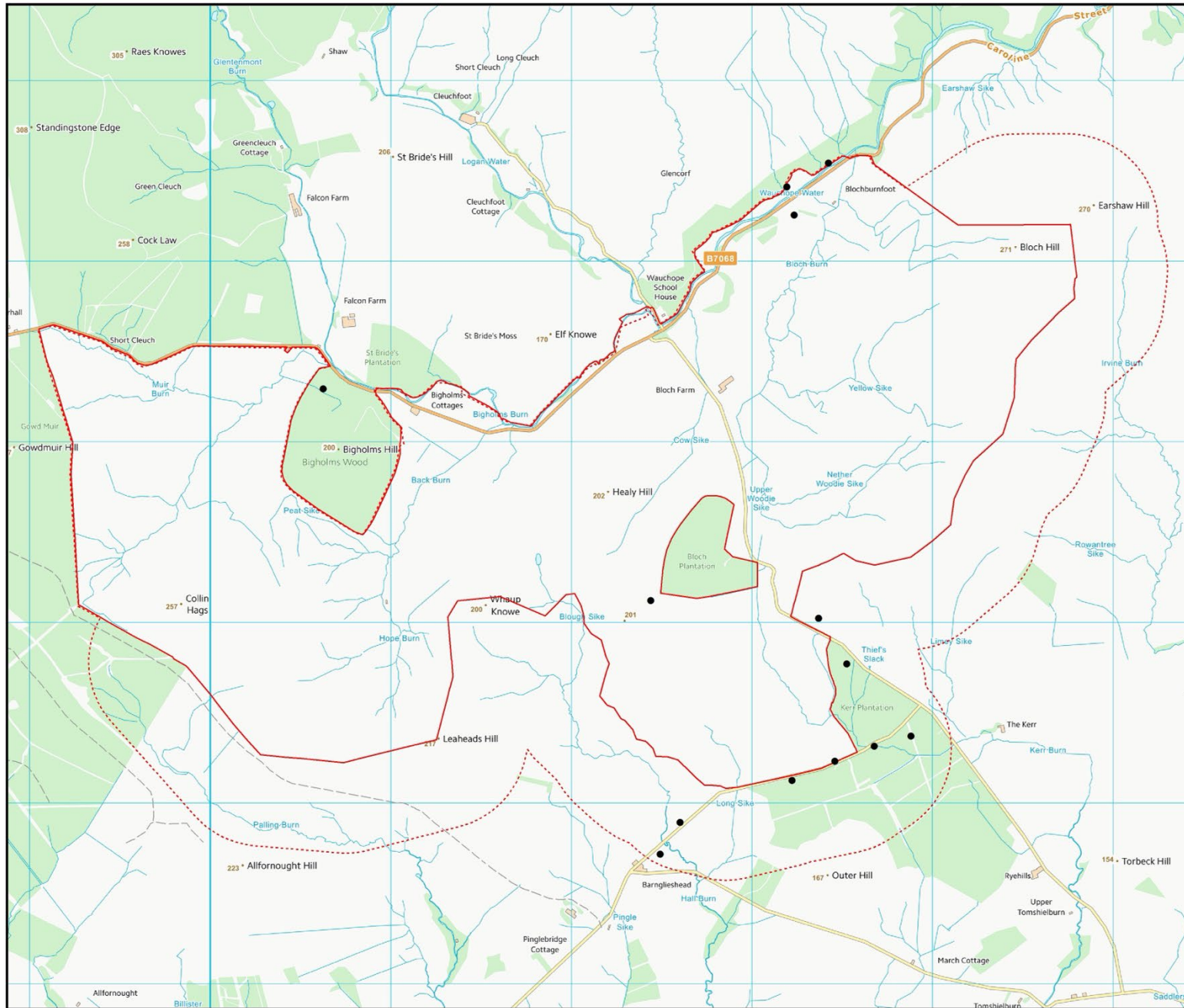
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 7  
Distribution of Breeding  
Dunnock**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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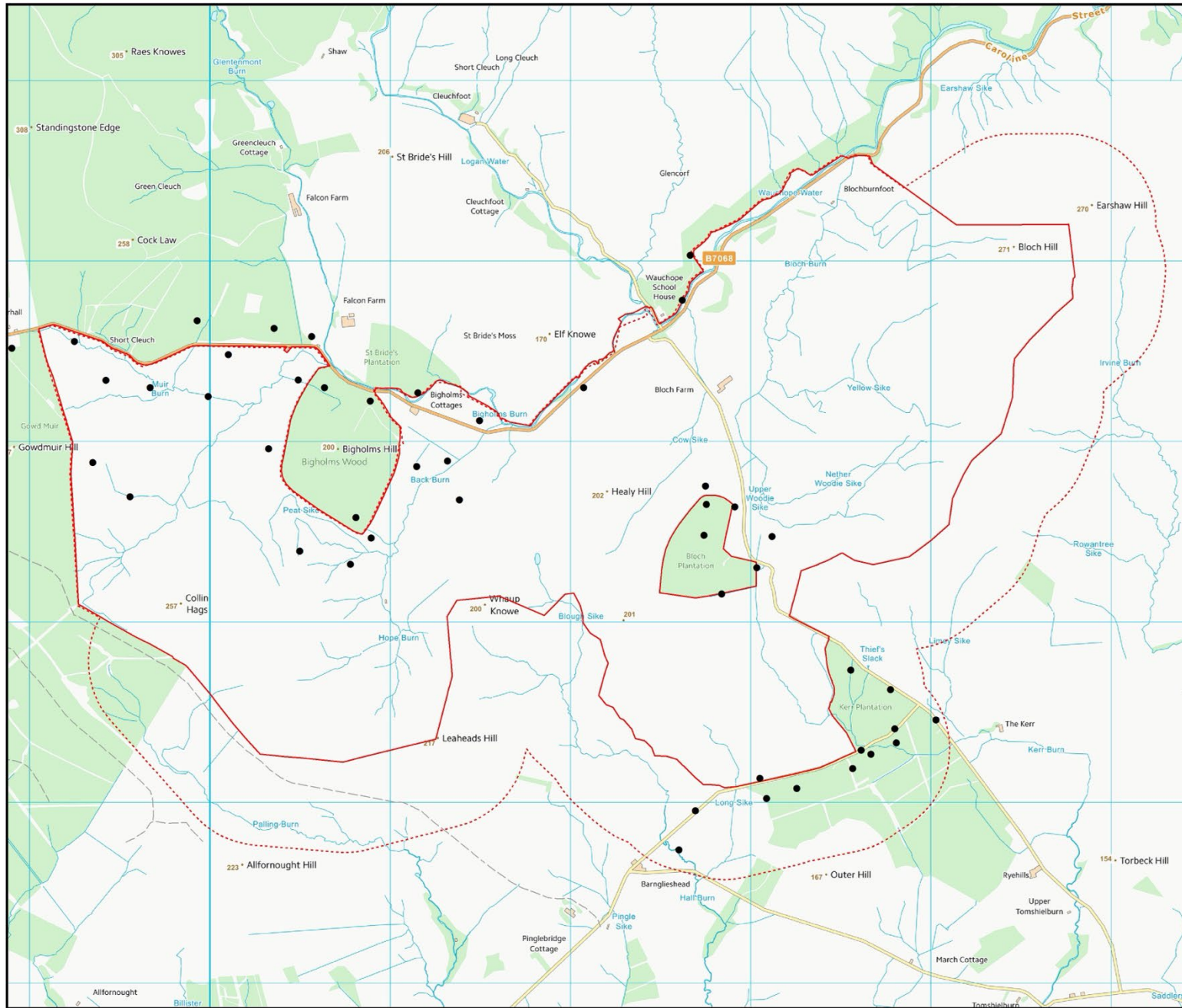
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 8  
Distribution of Breeding  
Song Thrush**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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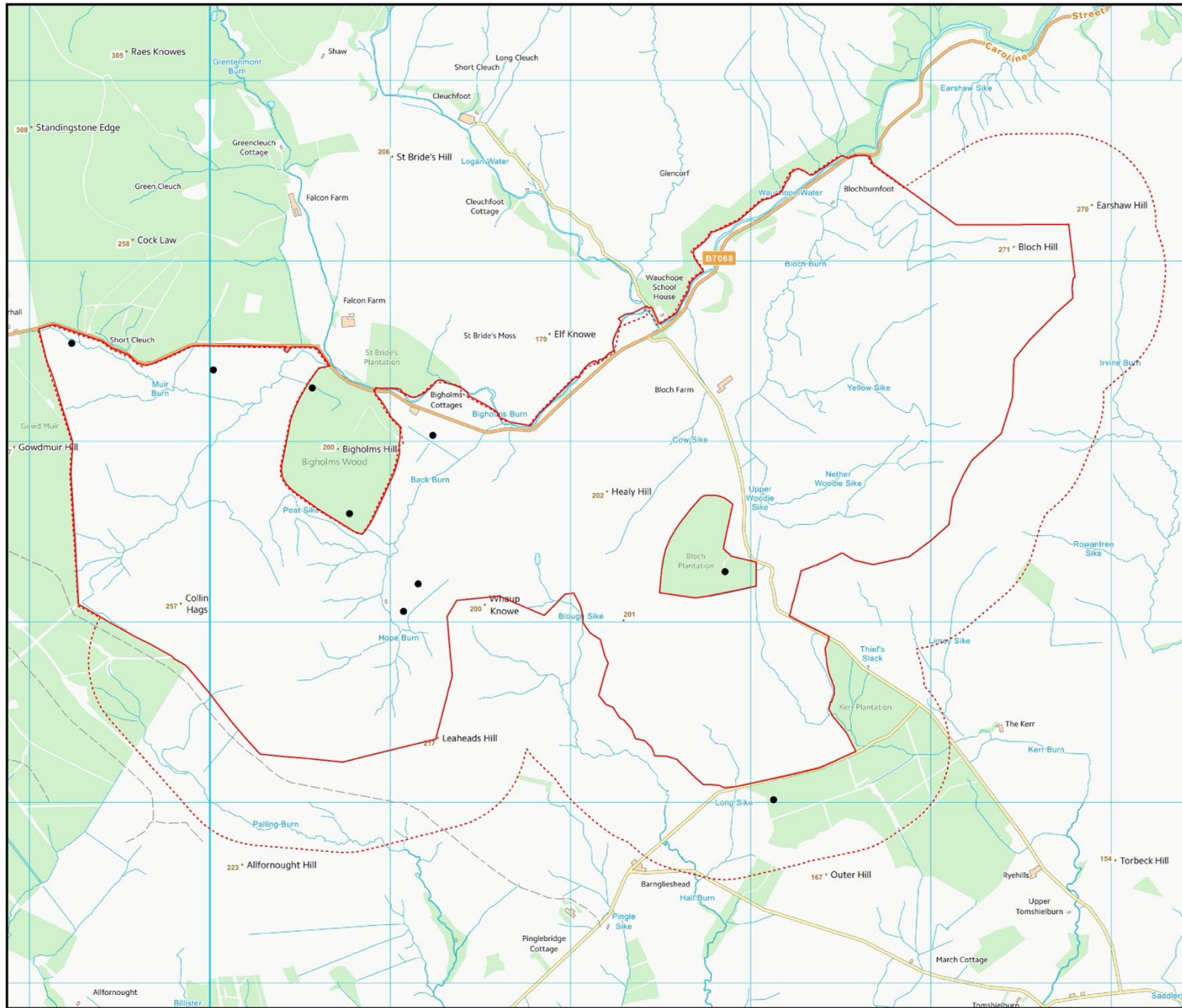
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 9  
Distribution of Breeding  
Mistle Thrush**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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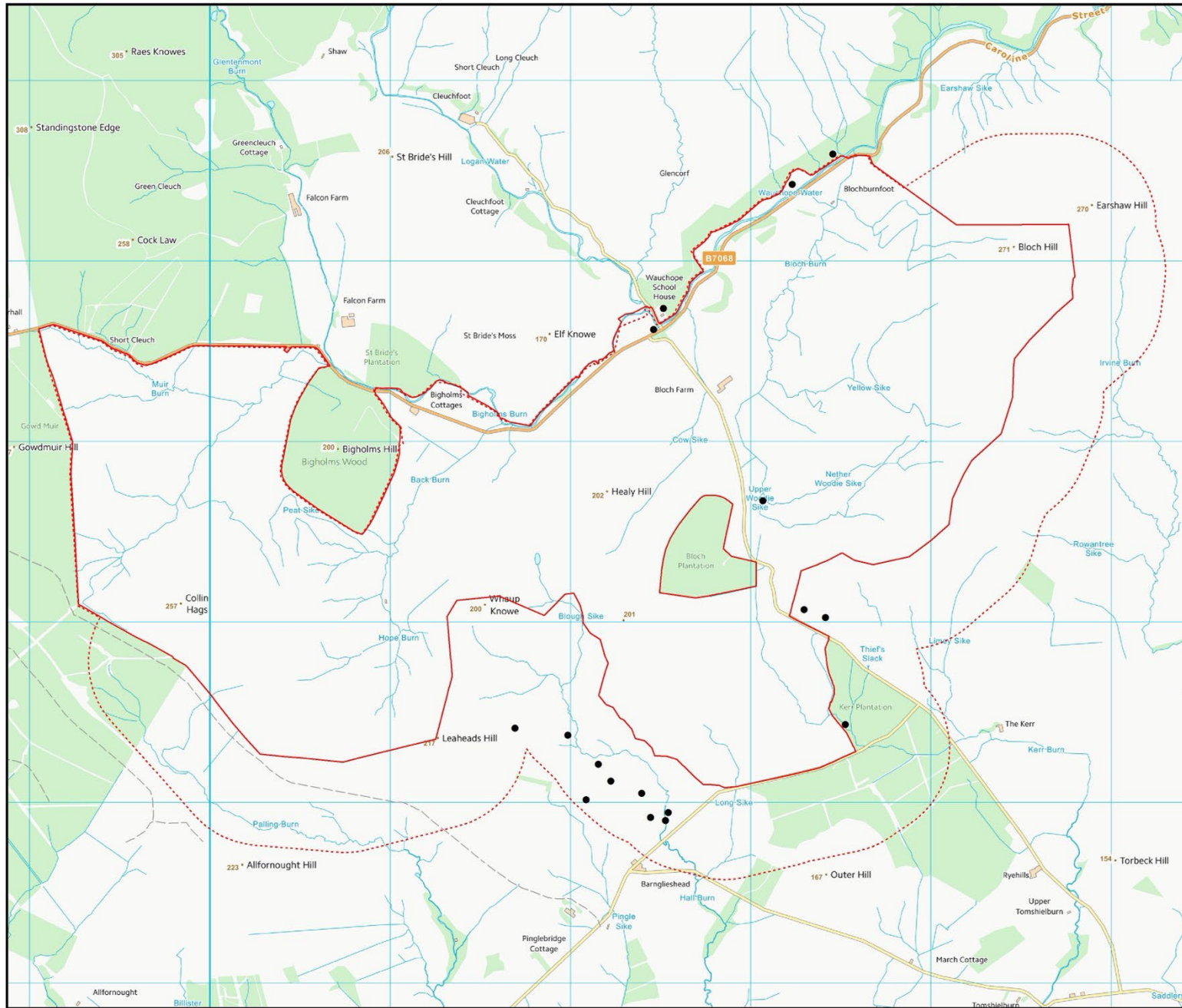
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 10  
Distribution of Breeding  
Sedge Warbler**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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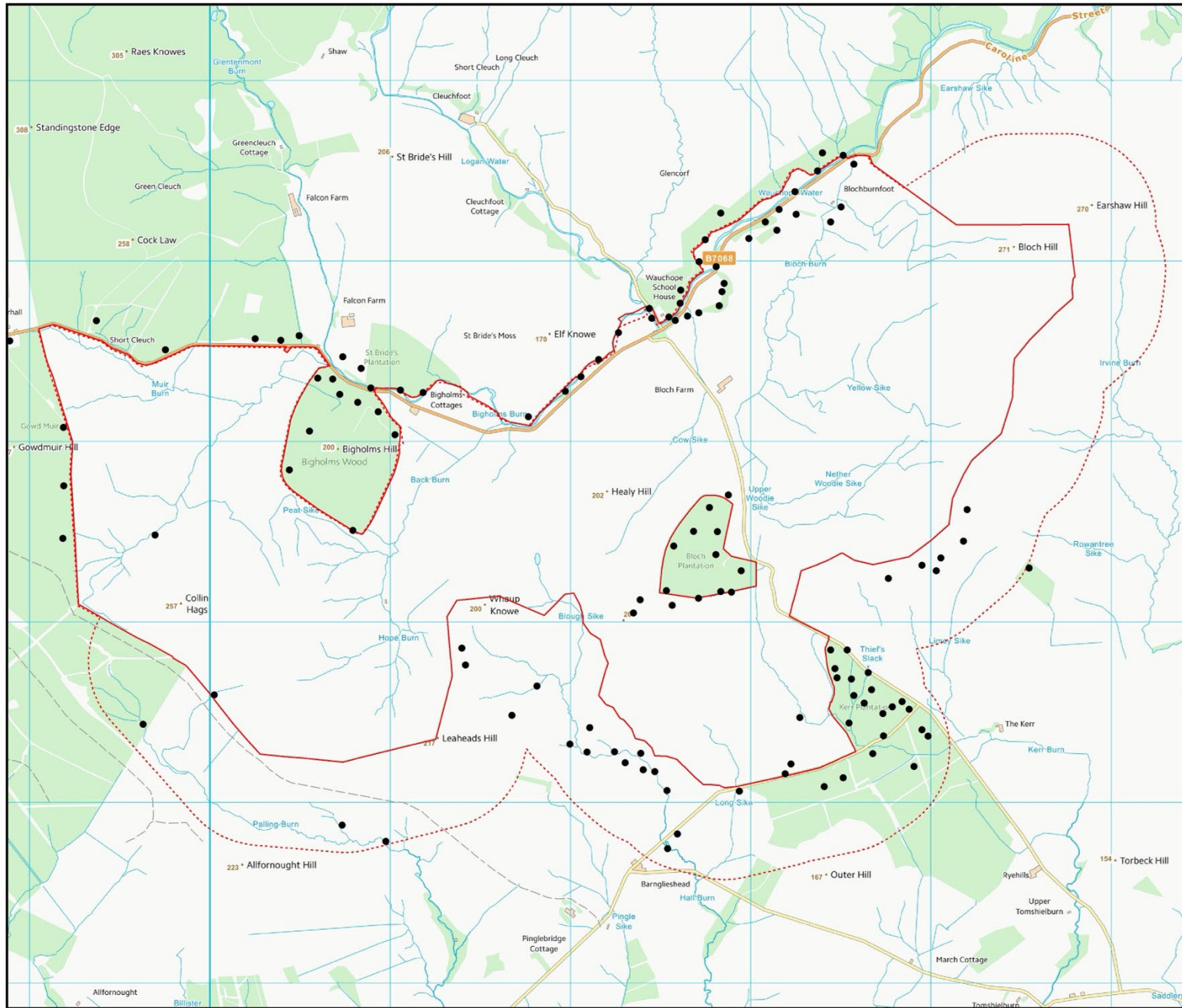
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 11  
Distribution of Breeding  
Willow Warbler**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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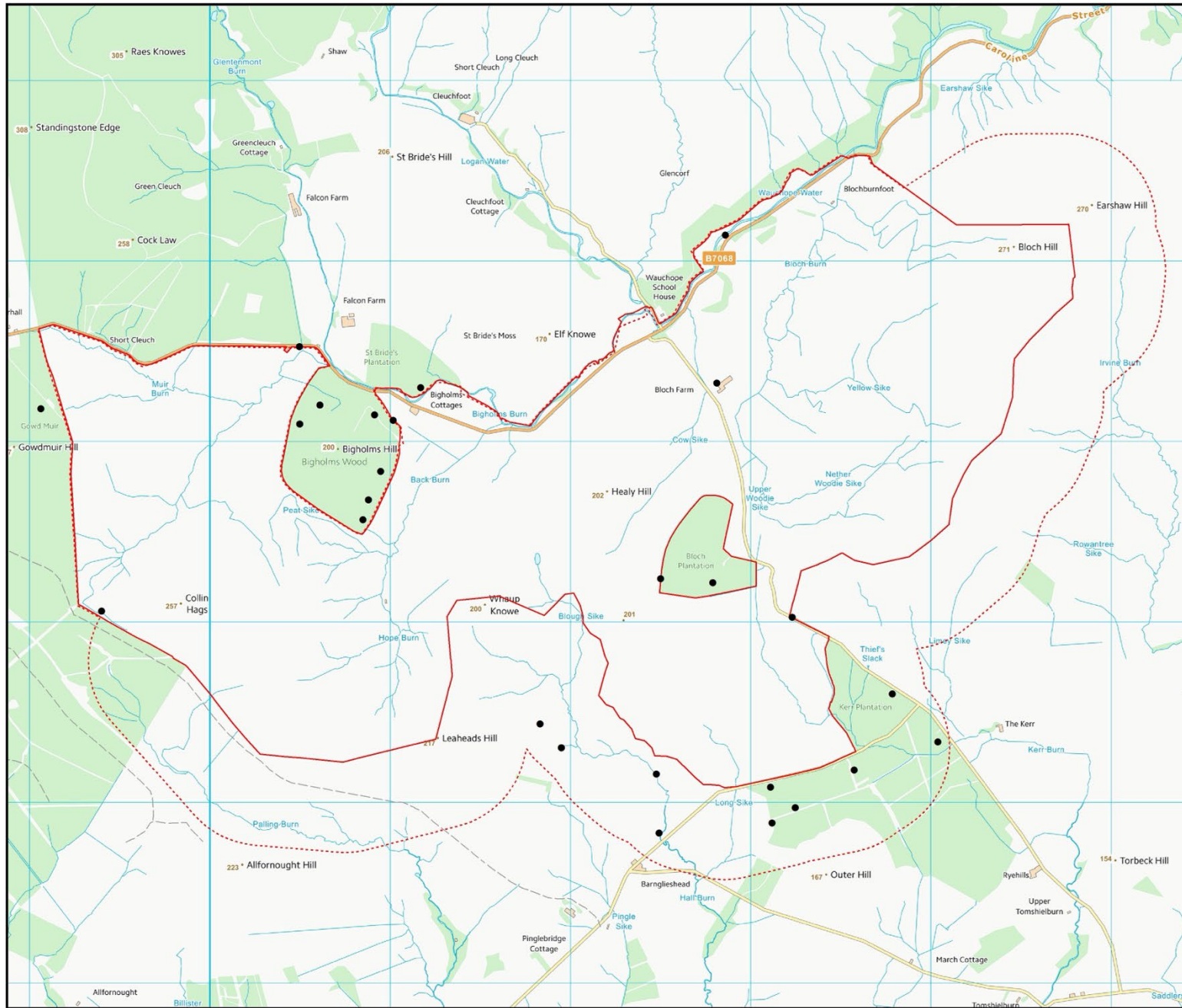
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 12  
Distribution of Breeding  
Siskin**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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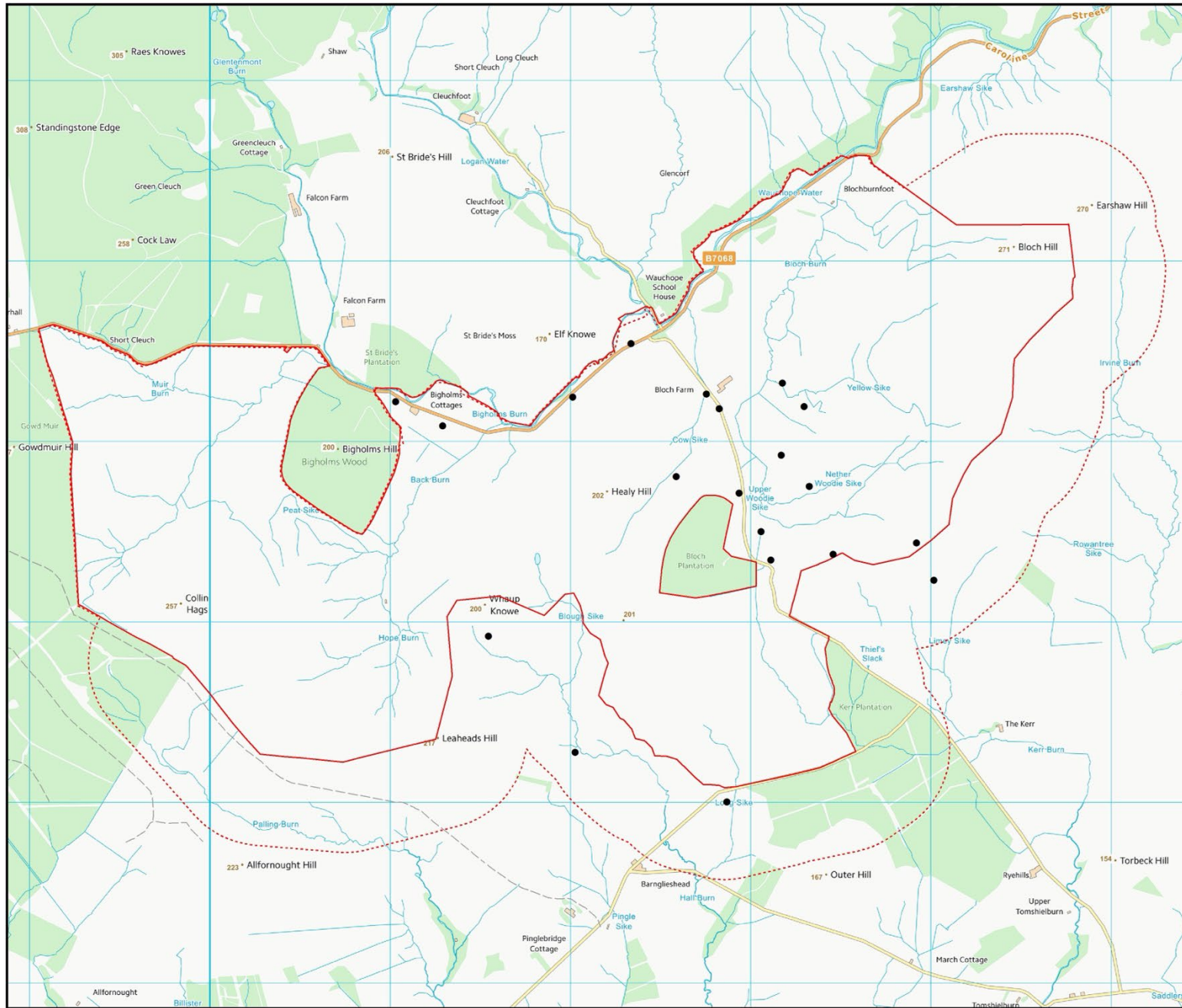
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 13  
Distribution of Breeding  
Linnet**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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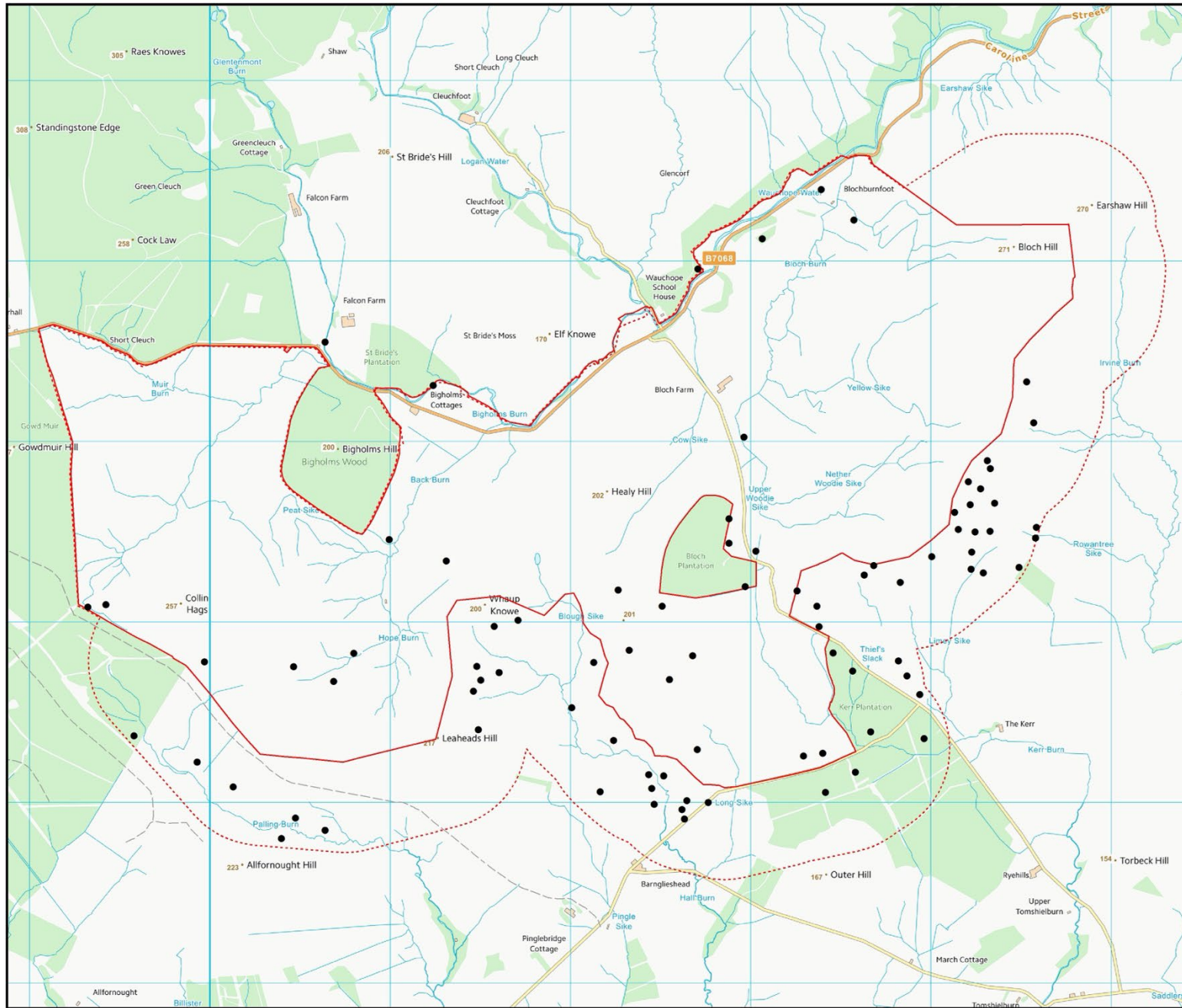
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 14  
Distribution of Breeding  
Lesser Redpoll**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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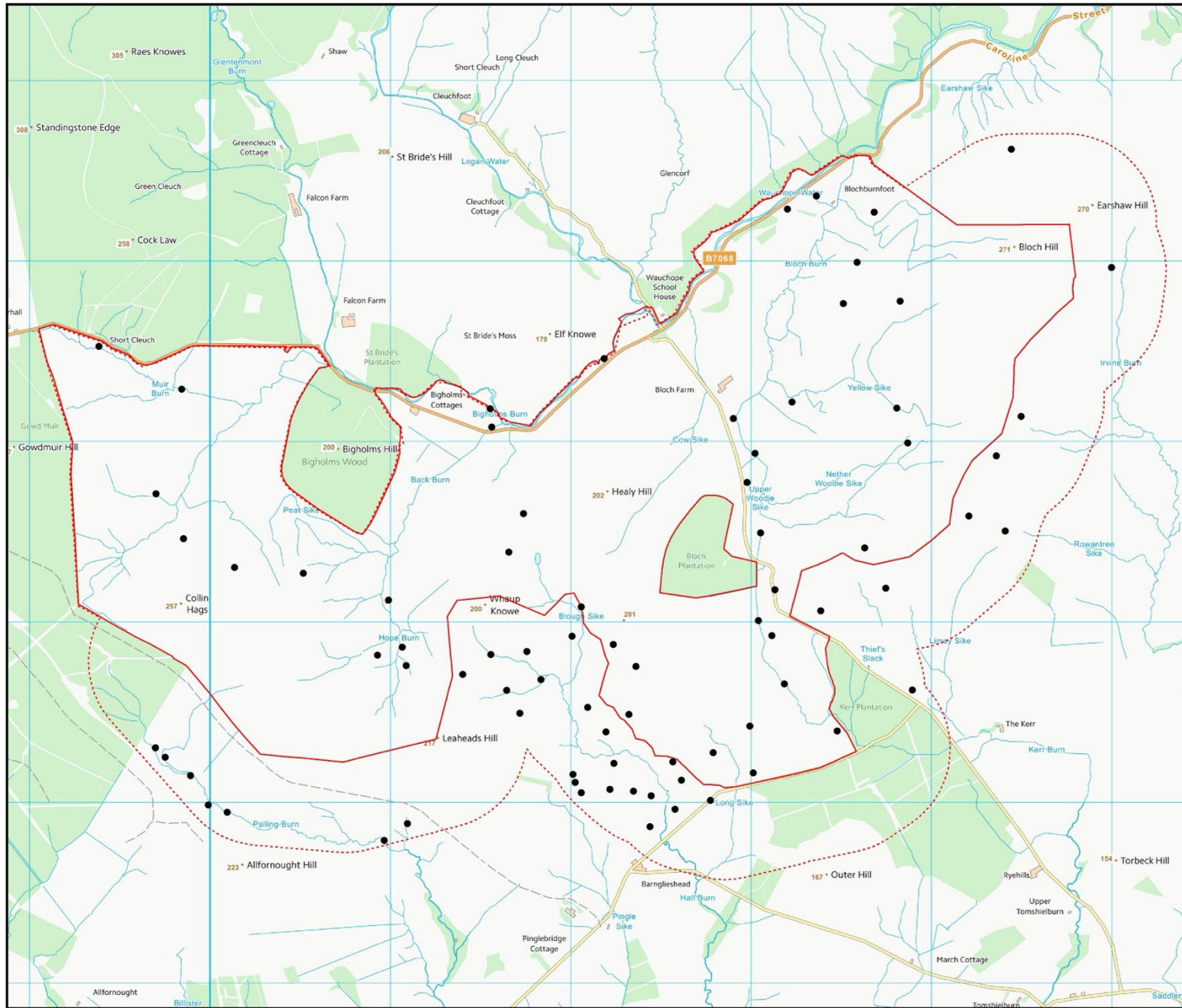
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 15  
Distribution of Breeding  
Reed Bunting**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Solwaybank wind farm tracks
- Approx breeding locations



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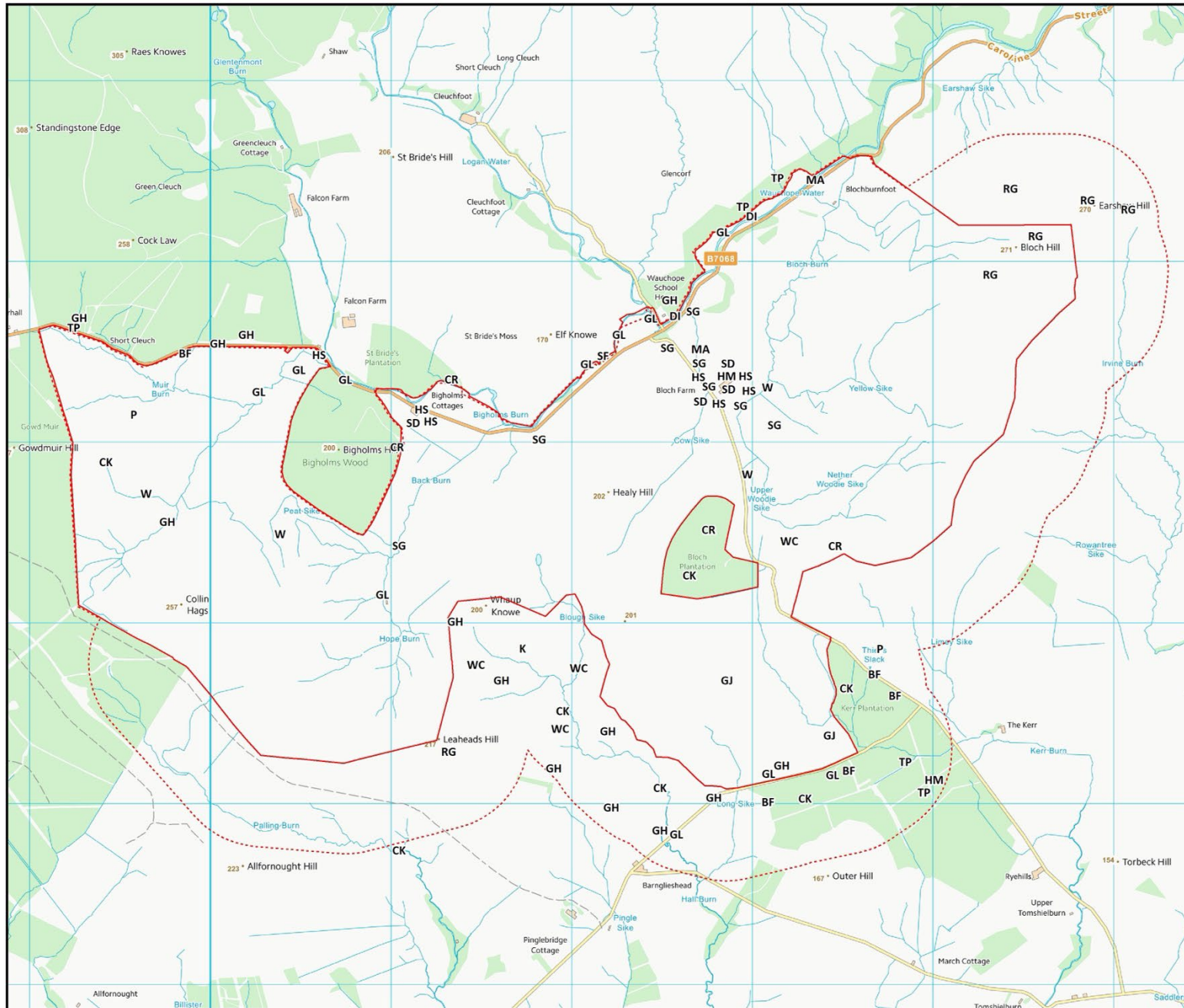
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 16**

**Distribution of Other  
Breeding Species**

**KEY:**

- Site Boundary
  - Core Breeding Bird Survey Area
  - Solwaybank wind farm tracks
- Approx breeding locations:

- GJ - Greylag Goose
- MA - Mallard
- RG - Red Grouse
- P - Grey Partridge
- K - Kestrel
- SD - Stock Dove
- CK - Cuckoo
- HM - House Martin
- TP - Tree Pipit
- GL - Grey Wagtail
- DI - Dipper
- WC - Whinchat
- W - Wheatear
- GH - Grasshopper Warbler
- SF - Spotted Flycatcher
- PF - Pied Flycatcher
- SG - Starling
- HS - House Sparrow
- CR - Common Crossbill
- BF - Bullfinch



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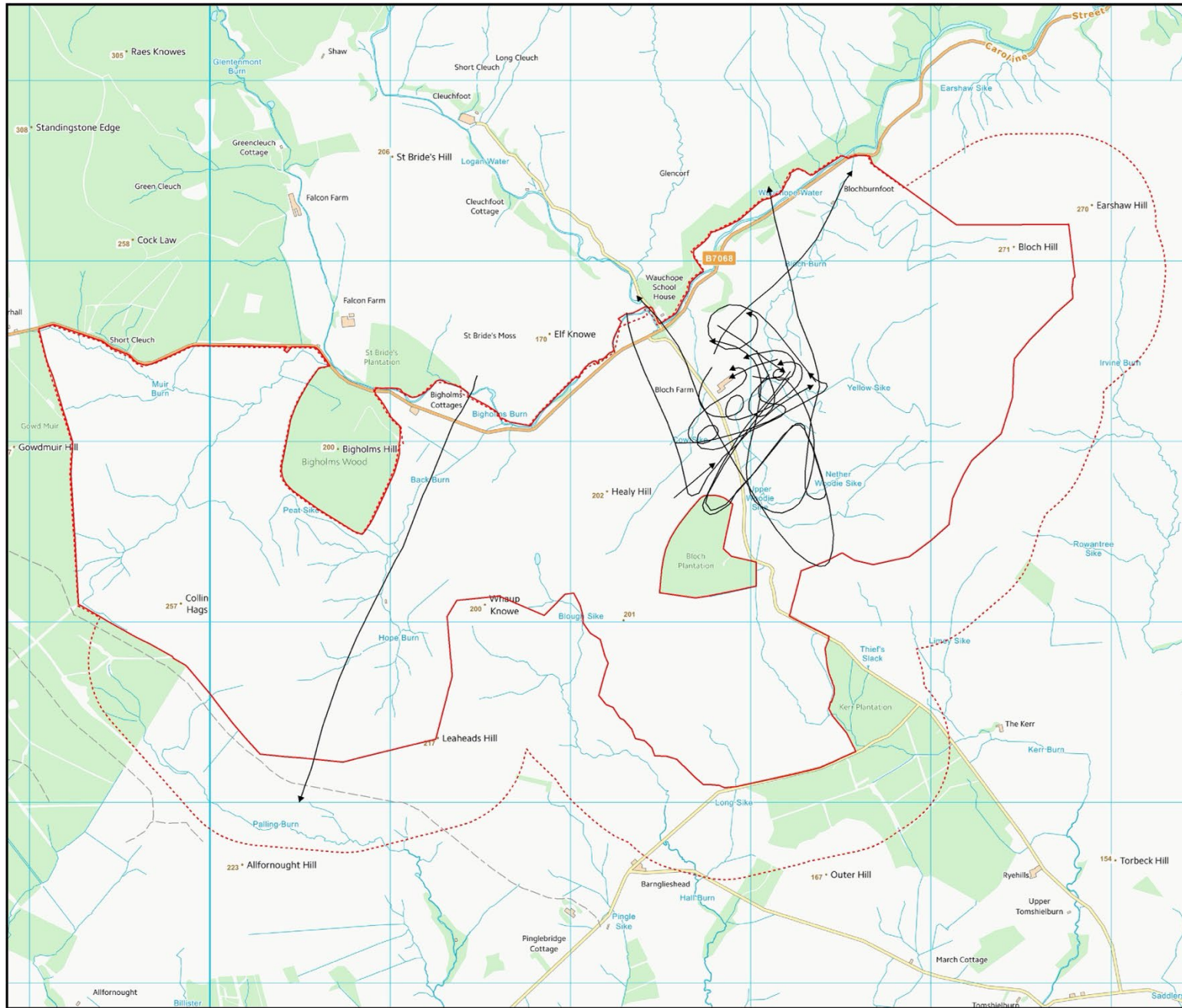
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 17  
Oystercatcher flight  
activity, 2022**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Flight Lines
- Solwaybank wind farm tracks



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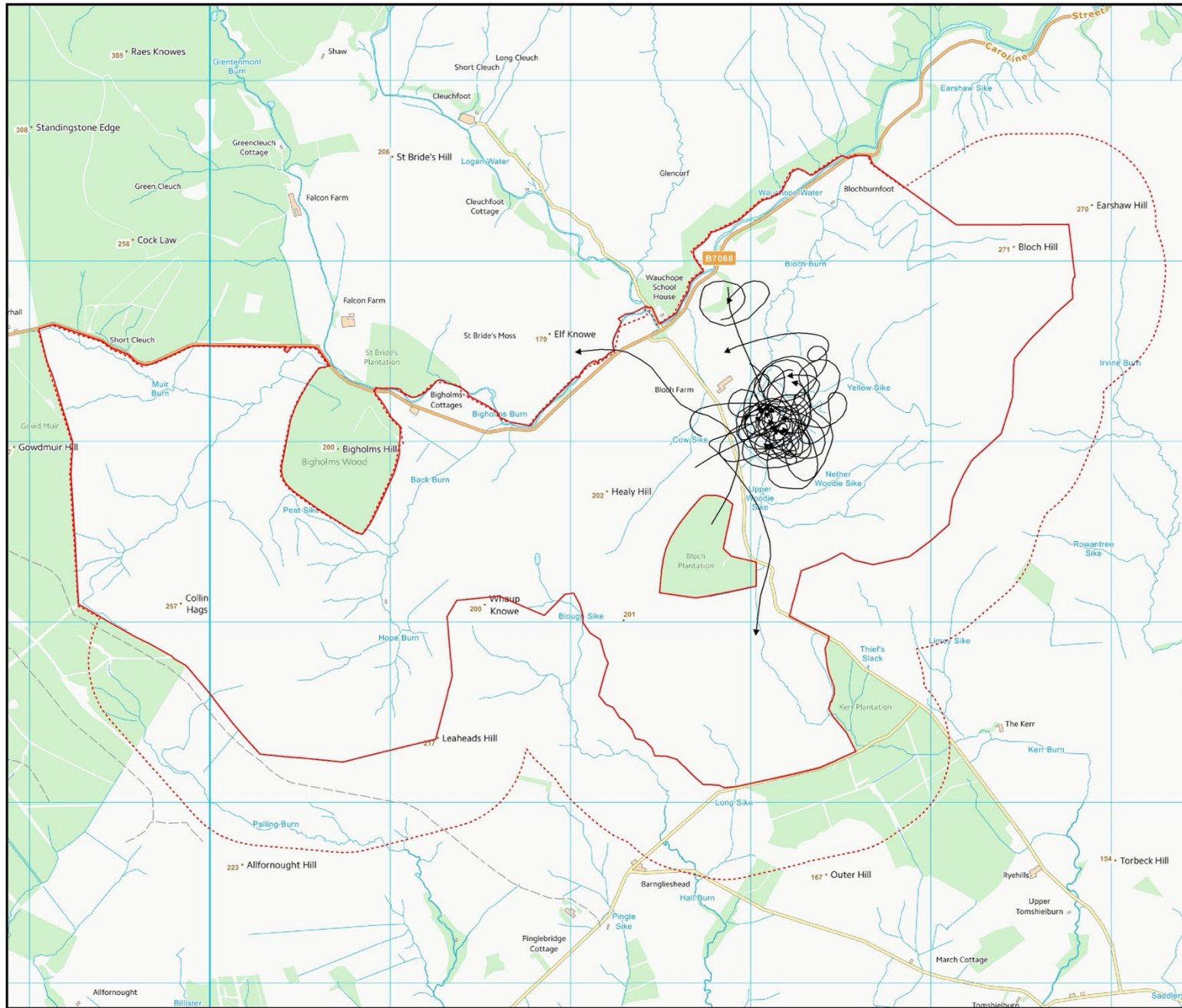
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 18**

**Lapwing flight  
activity, 2022**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Flight Lines
- Solwaybank wind farm tracks



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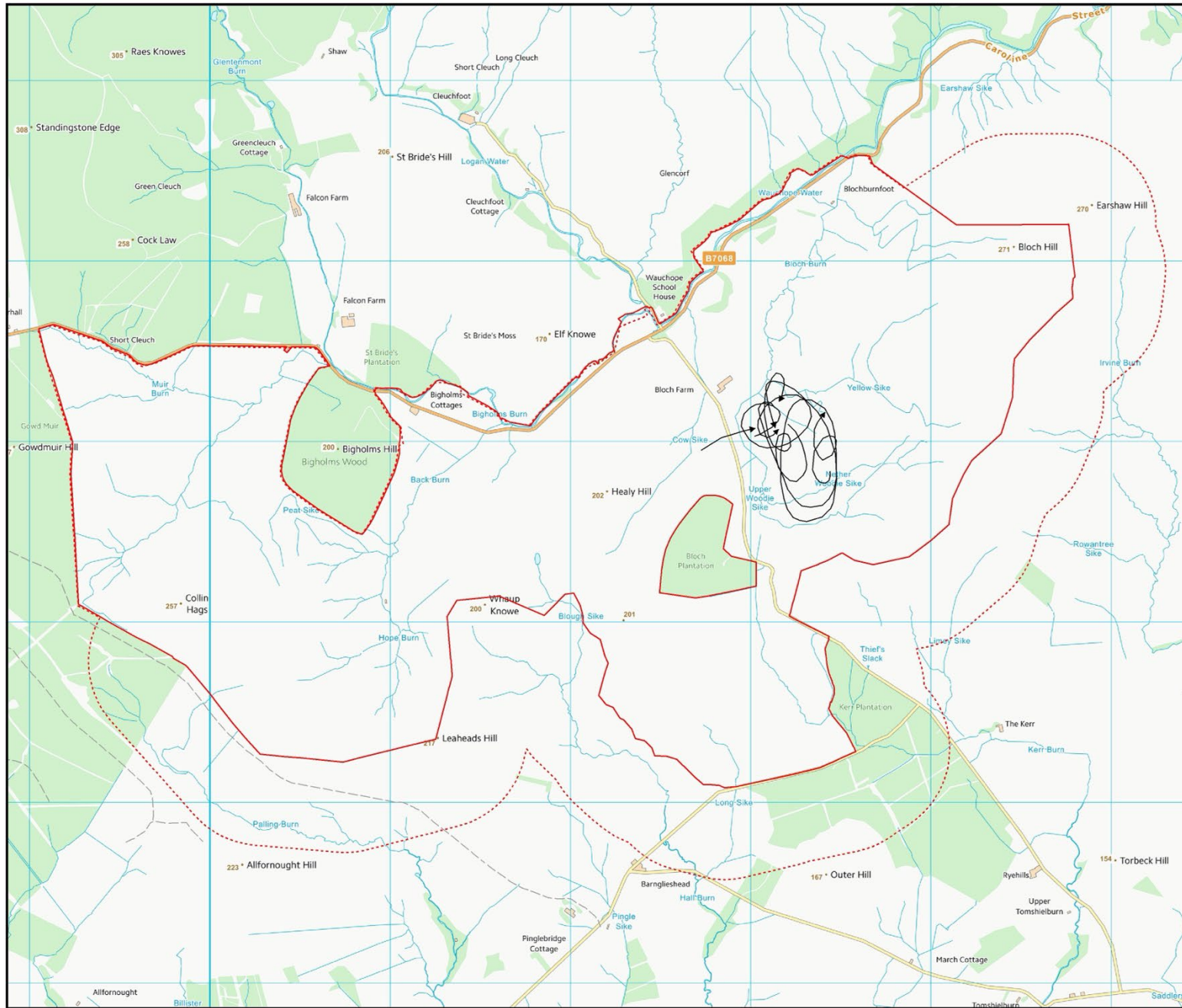
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 19**

**Snipe flight  
activity, 2022**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Flight Lines
- Solwaybank wind farm tracks



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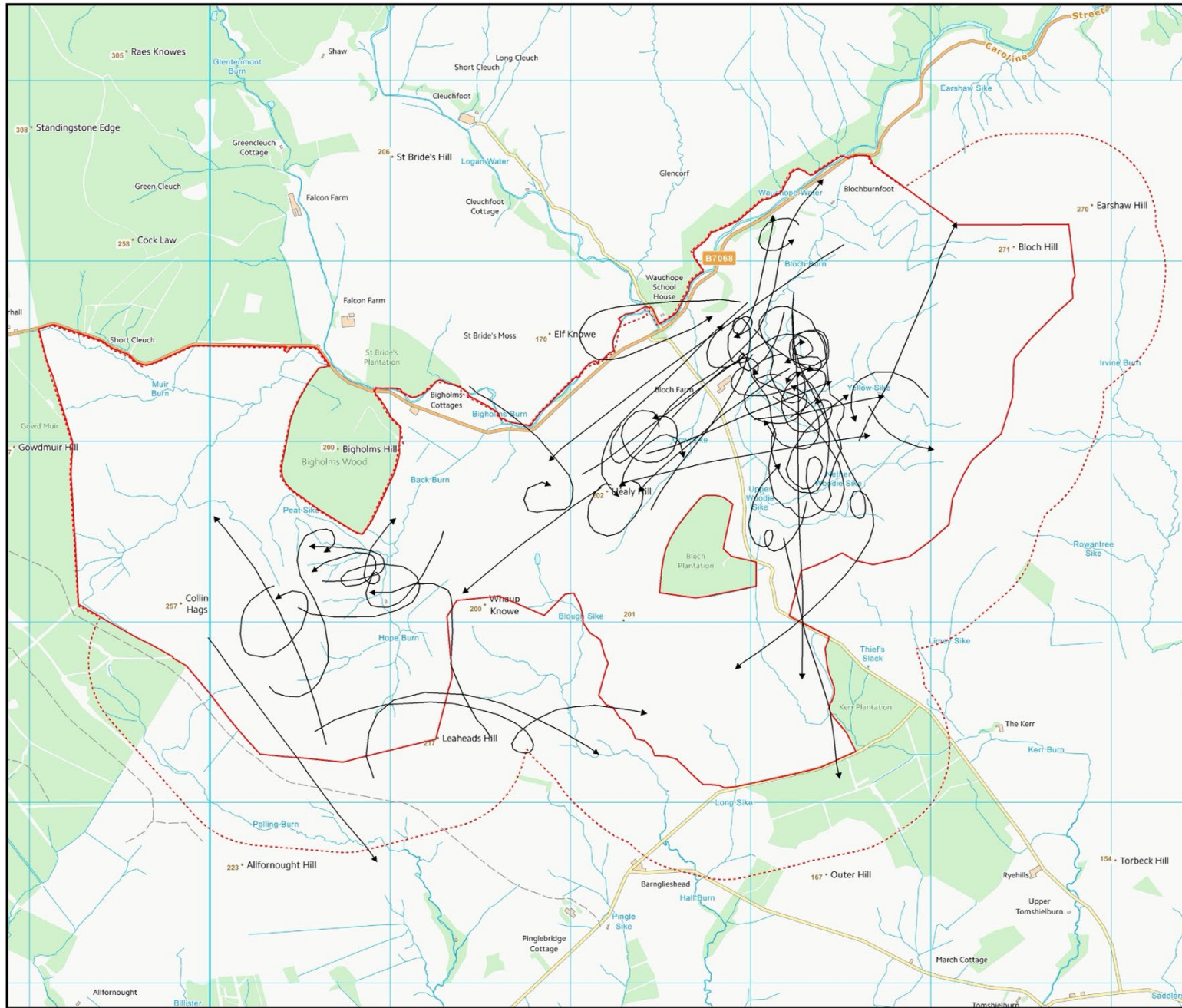
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 20**

**Curlew flight  
activity, 2022**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- Flight Lines
- Solwaybank wind farm tracks



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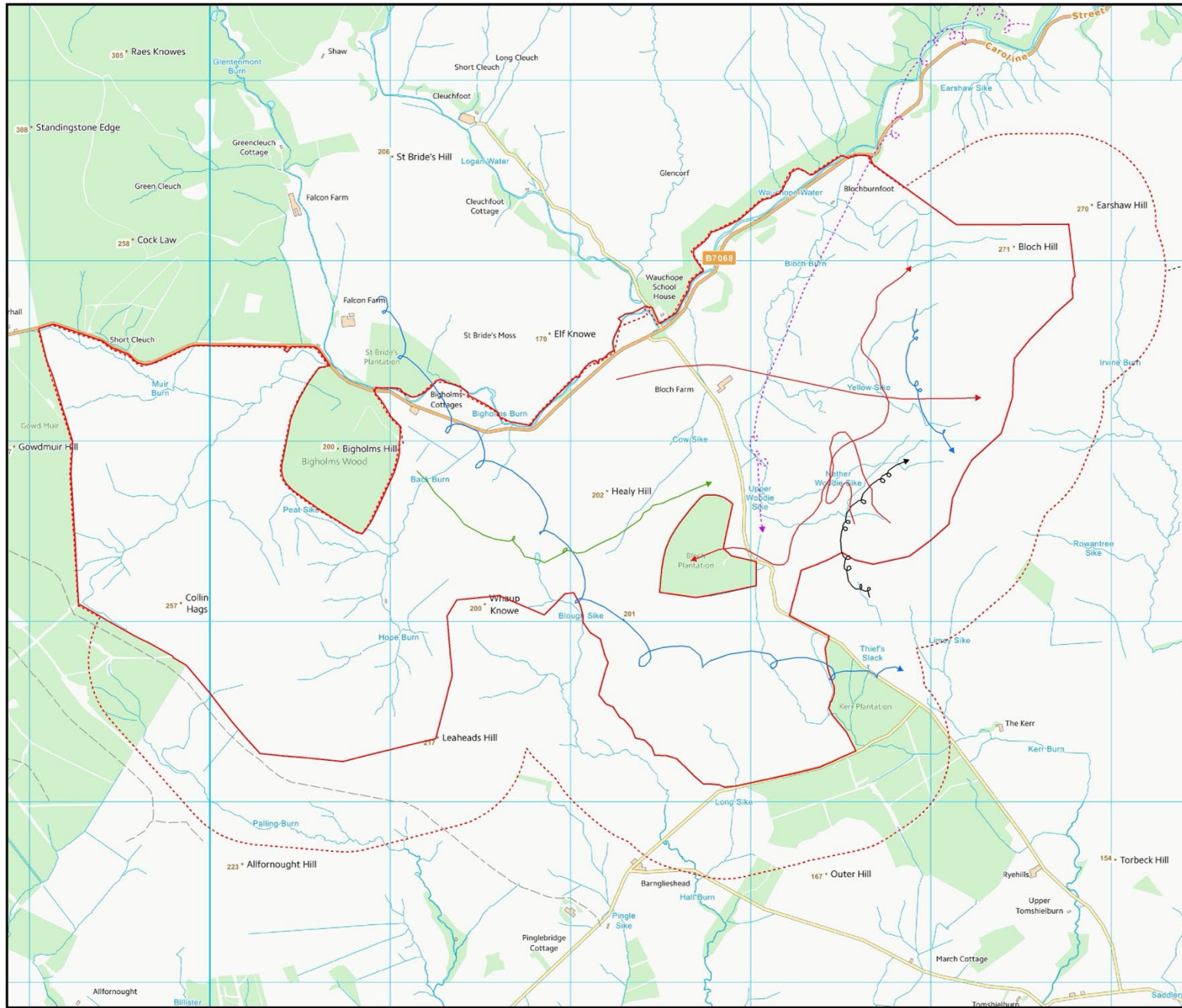
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**Bloch Wind Farm:  
Breeding Bird  
Surveys 2022**

**FIGURE 21**

**Scarce raptor flight  
activity, 2022**

**KEY:**

- Site Boundary
- Core Breeding Bird Survey Area
- VP Survey Flight Lines:**
- Goshawk
- Hen Harrier
- Red Kite
- Merlin
- Wider Area Surveys:**
- - - - - → Hen Harrier
- - - - - → Osprey
- - - - - Solwaybank wind farm tracks



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## APPENDIX 1. VANTAGE POINT SURVEY DATA

### Survey Information

Date	Vantage Point No	Start time	Finish time	Observation time	Weather
26/04/2021	3	12:20	15:20	03:00	cloud 8/8, wind SW 3, 9C, vis very good
26/04/2021	3	15:50	18:20	02:30	cloud 8/8, wind SW 3, 8C, vis very good
26/04/2021	3	18:50	20:50	02:00	cloud 8/8, wind SW 3, 8C, vis very good
26/04/2021	2	12:45	15:45	03:00	3 SW-WSW wind, 8/8 cloud, light showers, very good vis
26/04/2021	2	16:15	19:15	03:00	8/8 cloud, 3-2 WSW wind, good vis
26/04/2021	2	19:45	21:15	01:30	8/8 cloud, 3 SW wind, very good vis
24/05/2021	2	08:50	11:50	03:00	cloud 7/8, wind WSW 2, 10C, vis very good
24/05/2021	2	12:20	13:50	01:30	cloud 4/8, wind W 3, 11C, vis very good
24/05/2021	2	17:30	20:30	03:00	cloud 6/8, wind W 3, 12C, vis excellent
24/05/2021	3	17:40	20:40	03:00	8/8 cloud, 3-2 W-WSW wind, excellent vis, light rain
24/05/2021	3	08:40	11:40	03:00	4-6/8 cloud, 3 W wind, excellent vis
24/05/2021	3	12:10	13:40	01:30	3-6/8 cloud, 3-4 W wind, excellent vis
24/06/2021	2	06:30	09:30	03:00	cloud 8/8, wind WSW 1, 15C, vis good
24/06/2021	2	10:00	13:00	03:00	cloud 8/8, wind SSW 2, 15C, vis very good
24/06/2021	2	13:30	15:00	01:30	cloud 3/8, wind SSW 4, 18C, vis very good
24/06/2021	3	06:45	09:45	03:00	8/8 cloud, 0-3 WSW wind, excellent vis
24/06/2021	3	10:15	13:15	03:00	3-7/8 cloud, 2-4 WSW wind, excellent vis
24/06/2021	3	13:45	15:15	01:30	4-6/8 cloud, 3-4 WSW wind, excellent vis
13/07/2021	3	14:15	17:15	03:00	cloud 7/8, wind NNW 1, 20C, vis very good
13/07/2021	3	17:45	19:15	01:30	cloud 6/8, wind W 2, 20C, vis very good
14/07/2021	3	06:30	08:30	02:00	cloud 8/8, wind 0, 14C, vis very good
14/07/2021	2	07:10	10:10	03:00	7-8/8 cloud, 0-1 SSW wind, excellent vis
14/07/2021	2	10:40	13:40	03:00	5-8/8 cloud, 2 WSW - W wind, excellent vis
14/07/2021	2	14:10	15:10	01:00	4/8 cloud, 2 W wind, excellent vis
19/08/2021	2	08:45	11:45	03:00	8/8 cloud, 1 SSW - SW wind, very good vis, 13 to 14C
19/08/2021	2	14:30	17:30	03:00	6-8/8 cloud, 3 SW wind, excellent vis
19/08/2021	2	18:00	19:00	01:00	7/8 cloud, 3 SW wind, excellent vis
21/08/2021	3	09:00	12:00	03:00	8/8 cloud, 0-2 SE-SW wind, 14C to 16C, light to steady rain and periods of dry
21/08/2021	3	13:15	16:15	03:00	8/8 cloud, 1-2 SE-SW wind, excellent vis, 16C, very brief light rain shower
21/08/2021	3	17:35	18:35	01:00	8/8 cloud, 3 SE wind, very good vis, light rain

## Key Species Data

VP	Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time bird observed (sec)	Notes
3	26/04/2021	12:22	L	2	circle	13	display	480	on and off throughout
3	26/04/2021	12:25	CU	1	SW	10	display	70	male, landed
3	26/04/2021	12:50	CU	1	W	6	display	30	male, same as 2, landed
3	26/04/2021	13:05	CU	2	SSW	13	display	80	pair, same as 4
3	26/04/2021	13:06	CU	1	SSW	18	display	50	
3	26/04/2021	13:55	CU	2	SSW	15	flushed	70	pair landed, brief display
3	26/04/2021	13:56	CU	2	ENE	23	display	110	pair same as 5, landed
3	26/04/2021	14:26	CU	1	SSE	10	display	70	male, same as 10
3	26/04/2021	14:44	CU	2	SSW	13	display	80	
3	26/04/2021	14:56	OC	1	SSW	8	feed	50	landed
3	26/04/2021	16:01	CU	2	SSE	15	display	80	pair landed, brief display
3	26/04/2021	16:01	CU	1	SSW	13	display	70	male, landed
3	26/04/2021	16:25	CU	1	SSE	10	display	80	male, same as 3, landed
3	26/04/2021	16:54	OC	2	SSW	5	feed	30	landed
3	26/04/2021	17:26	L	1	circle	8	display	70	landed
3	26/04/2021	17:57	L	1	circle	10	display	60	landed
3	26/04/2021	18:10	OC	2	SW	9	flushed	40	pair same as 8, landed on barn roof
3	26/04/2021	19:06	CU	2	SSW	9	roost	50	landed
3	26/04/2021	19:10	L	1	circle	8	display	60	landed
3	26/04/2021	19:29	CU	1	N	3	feed	20	male, landed
3	26/04/2021	19:58	CU	2	SW	9	display	70	same as 2, landed
3	26/04/2021	20:06	L	1	circle	6	display	50	landed
3	26/04/2021	20:26	CU	2	circle	15	display	60	same as 21
2	26/04/2021	13:13	CU	1		20	display	110	
2	26/04/2021	13:45	CU	1	SW	13		60	landed
2	26/04/2021	13:56	CU	2	W	28		130	
2	26/04/2021	14:01	CU	1	SE	25		90	
2	26/04/2021	18:12	HH	1	circle S	93		300	male
2	24/05/2021	09:11	CU	1	SSW	10		80	
2	24/05/2021	10:18	CU	1	circle	13	display	150	landed
2	24/05/2021	10:26	CU	1	circle	10	display	90	same as 6, landed
2	24/05/2021	11:10	CU	1	NNE	7		50	
2	24/05/2021	13:18	CU	1	SSW	3		20	landed
3	24/05/2021	17:46	L	3		20		80	
3	24/05/2021	17:50	OC	1	SE	20		70	with 3
3	24/05/2021	17:50	OC	1	SE	15		50	with 2
3	24/05/2021	18:02	CU	2	SW	30		130	landed
3	24/05/2021	18:08	CU	2	SW	8		35	flew from ground
3	24/05/2021	18:11	L	1		5		30	
3	24/05/2021	18:26	L	2		3		70	
3	24/05/2021	18:37	L	2		8		150	
3	24/05/2021	19:11	CU	1		5	display	45	
3	24/05/2021	19:21	L	1		3		70	
3	24/05/2021	19:35	L	1		3		25	
3	24/05/2021	19:56	SN	2		25	display	75	
3	24/05/2021	20:15	CU	1	SW	7		90	
3	24/05/2021	08:57	L	1	WNW	2		25	flew between fields
3	24/05/2021	09:36	L	1		13	mob	40	mobbed C
3	24/05/2021	10:18	L	1		10		45	
3	24/05/2021	10:38	L	1		10		120	
3	24/05/2021	11:29	L	2		15		420	
3	24/05/2021	12:36	L	2		10		170	
3	24/05/2021	12:55	L	1		5	mob	20	mobbed C
3	24/05/2021	13:26	CU	1	SE	40		130	
3	24/05/2021	13:35	CU	1	WSW	15		60	
2	24/06/2021	07:00	CU	2	SE	33	display	1560	pair responding to intruder
2	24/06/2021	07:00	CU	1	SSW	30	display	1080	
2	24/06/2021	07:17	OC	3	SSW	43		170	
2	24/06/2021	07:51	CU	1	SE	23	display		
2	24/06/2021	08:46	CU	1	SSE	50		90	
2	24/06/2021	14:47	CU	1	SW	33		70	
3	24/06/2021	07:13	OC	2	circle	15		90	
3	24/06/2021	07:17	OC	1	E	10		70	landed
3	24/06/2021	09:12	CU	2	NW	40		70	
3	24/06/2021	11:23	PE	1	ESE	13		50	adult, landed
3	24/06/2021	11:28	PE	1	NW	20		60	adult, flew from ground
3	13/07/2021	14:28	GI	1	SSW	21	hunt	120	female, prob 2cy
3	13/07/2021	17:04	OP	1	W	43		200	
3	14/07/2021	06:50	SN	1	circle	15	display	80	chipping, landed
3	14/07/2021	06:54	SN	1	circle	25	display	110	drumming, landed again
3	14/07/2021	07:14	SN	1	W	4		20	landed
3	14/07/2021	07:33	SN	1	circle	18	display	170	chipping, landed
3	14/07/2021	08:00	OC	1	ENE	6	feed	50	landed
3	14/07/2021	08:12	L	12	NE	60		140	
3	14/07/2021	08:15	SN	1	circle	50	display	750	drumming, landed again
2	19/08/2021	16:41	L	1	SSE	55	direct flight	115	
3	21/08/2021	11:48	L	2	S	13		40	landed
3	21/08/2021	13:31	L	1	circle SW	5		55	flew between field
3	21/08/2021	14:48	L	19	S	20		70	landed
3	21/08/2021	15:04	GI	1	S	6		25	adult, lost to view
3	21/08/2021	15:15	L	21		15		130	flew between fields
3	21/08/2021	18:14	SN	3	SW	23		70	