

Ecological Assessment Report for the Proposed Three Oaks Renewable Energy Park, Thornholme, East Yorkshire

Report to Ridge Clean Energy Ltd

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ECOLOGICAL ASSESSMENT OF THE PROPOSED THREE OAKS RENEWABLE ENERGY PARK, THORNHOLME, EAST YORKSHIRE

Introduction

1. This report presents an Ecological Impact Assessment for the proposed Three Oaks Renewable Energy Park, Thornholme, including an Extended Phase 1 Habitat survey and Biodiversity Net Gain calculation. The report has been prepared with reference to the CIEEM (2017) guidance on Preliminary Ecological Appraisal. The key objectives of the assessment were as follows:
 - identify the likely ecological constraints associated with the project;
 - identify any mitigation measures likely to be required, following the 'Mitigation Hierarchy';
 - identify any additional surveys that may be required to inform the Ecological Impact Assessment (EiA); and
 - identify the opportunities offered by a project to deliver ecological enhancement.
2. A desk study was undertaken to collate the available ecological information on the site, and a field survey to determine the habitats present and likely ecological issues. Additional baseline surveys have also been undertaken (including specific surveys for breeding and wintering birds, bats and badgers), and a Biodiversity Net Gain calculation was carried out.
3. The bird and bat surveys were undertaken by Tom Lowe and Stuart Piner, and all the other surveys were undertaken by Dr Steve Percival, all highly experienced ecological surveyors each with over 20 years field survey experience.

Study Area

4. The site is located approximately 1km north of Thornholme village and 5km west-south-west from Bridlington in East Yorkshire. The baseline survey areas were chosen to include all areas within the potential zone of ecological influence of the renewable energy park and a buffer around that to be contextual information on the area's ecology. The survey area covered a total area of 7.5km² (see Figure 1). It is predominantly open arable farmland and lies within the 'Yorkshire Wolds' NE Natural Area.

Desk Study Methods

5. A desk study was carried out to determine the protected nature conservation sites in the area (using a search radius of 5km for nationally important sites and 20km for internationally important sites); and collate available records of key species from the site and its surrounds. Information was collated from the following sources:

- Natural England and Magic Map web site - statutory protected area site boundaries and citation details, protected species records and distribution of priority habitats;
- North-east Yorkshire Ecological Data Centre North East (NEYEDC) – protected and notable species records found within a 2km search area around the site, and further information on statutory and non-statutory sites (including Local Wildlife Sites) and priority habitats.

Ecology Field Survey: Extended Phase 1 Survey Methods

6. An extended Phase 1 survey was carried out (consistent with the UKHAB habitat classification), including identification and mapping of the vegetation communities present within the study area. The study area boundary for this work included a 100m buffer outside the site boundary (where access/viewing was possible). This Extended Phase 1 survey was undertaken during a site visit on 29 September 2020 (supplemented by a further visit on 9 June 2022).
7. The survey also included a habitat suitability assessment for protected species, including bats, badgers, water voles, otters, reptiles and amphibians, which informed the need for further specific surveys.

Breeding Bird Surveys 2020

8. Breeding bird surveys were undertaken during the 2020 breeding season, following the standard Common Birds Census methodology, with four surveys undertaken at approximately monthly intervals during April-July 2020. Breeding season vantage point surveys of bird flight activity were also undertaken. Full details are provided in Appendix 1.

Wintering Bird Surveys 2019-20

9. Wintering bird surveys were undertaken during the 2019-20 winter. This included a field survey based on a simple 'look-see' method, counting the bird numbers within a pre-defined survey area (Gilbert *et al.* 1998) and a vantage point survey, monitoring bird flight activity to quantify movement rates across the survey area, and included daytime movements and dawn/dusk roost flights. Full details are provided in Appendix 2.

Bat Surveys

10. The bat survey programme was designed with reference to the recent SNH/Natural England *et al.* (2019) guidance on 'Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation'. The surveys comprised the following:
 - Roost potential survey - to assess all potential roosts sites within the proposed development site and its surrounds.

- Ground-level activity surveys – one transect-based survey each month from April-September 2020.
 - Automated surveys at ground level - these were deployed to enable collection of representative data across the site's habitats, from April through to September 2020.
 - Static detectors were deployed at six locations across the survey area representative of the habitats available.
11. The surveys were carried out during April-September 2020. Full details are provided in Appendix 3.

Badger Surveys

12. Though there were no records from the desk study within 1km of the proposed development, this appeared to be largely a result of low survey effort in this species area rather than absence from the locality. Badger surveys were undertaken in September 2020 (with a further follow-up survey in June 2022) of the proposed development area plus a 500m buffer, following the method of Harris *et al.* 1989 and SNH (2003). All areas of potential value to badgers were surveyed and any evidence of badger activity recorded including details of setts and associated soil excavation, latrines and dung pits, prints, hairs, paths and evidence of foraging activity.

Biodiversity Net Gain Calculation Methods

13. The data gathered during the desk study and the field surveys have been used to undertake a biodiversity net gain calculation for the project, following the DEFRA/Natural England Biodiversity Metric 3.0 methodology (Panks *et al.* 2021).

Desk Study Results

Statutory Designations: International and Nationally Important Sites

14. There are five statutory designated internationally/nationally important nature conservation sites in the search area around the proposed Renewable Energy Park (5km for nationally important SSSIs, 20km for internationally important European Protected SPAs, SACs and Ramsar Sites):
- **Boynton Willow Garth SSSI** - 1.7km NE from the site – one of the best examples of fen carr in North Humberside, and is particularly important for the range of trees and shrubs it supports. It contains a diverse mosaic of contrasting habitats: woodland, scrub, fen and running water. It is also a site of national importance in the Geological Conservation Review.
 - **River Hull Headwaters SSSI** - 4km SW from the site – nationally important as the most northerly chalk stream system in Britain, with riverside grassland, woodland and fen. It also supports diverse invertebrate and breeding bird communities.

- **Flamborough and Filey Coast SPA/SAC** – 7km E from the site – internationally important breeding seabird colony which supports the only mainland gannetry in England, the largest kittiwake colony in the UK and the largest guillemot and razorbill colonies in England. Designated habitats including reefs, vegetated sea cliffs of the Atlantic and Baltic coasts, and sea caves.
 - **Greater Wash SPA** – 9km SE from the site – marine site designated for its populations of common scoter, common tern, little gull, little tern, red-throated diver, and Sandwich tern.
 - **Hornsea Mere SPA** – 18km SE from the site – important wetland habitat designated for its populations of gadwall and mute swan.
15. Given their ecological interest features and their distance from the proposed development, none of these would be likely to be affected by it.

Other Sites/Priority Habitats

Local Nature Reserves

16. There are no Local Nature Reserves (LNR) within 2km of the site, and none that would be affected by the proposed development.

Local Wildlife Sites

17. Eight Local Wildlife Sites (LWS) are located within 2km of the proposed development (Table 1). Their locations are shown in Figure 1. All are more than 1km from the proposed development and none would be likely to be affected by it.

Table 1. Local Wildlife Sites within 2km of the proposed Three Oaks Renewable Energy Park.

Site Name	Site Ref	Grid Reference	Status	Distance and direction from Development
Sands Wood	TA1065-12	TA130670	Deleted LWS	1.1km NE
Zigzag Plantation	TA1065-09	TA105670	Deleted LWS	1.1km NW
The Belt	TA1065-10	TA110671	Deleted LWS	1.2km N
Rudston South	TA0565-04	TA099667-TA100658	Designated LWS	1.4km NW
Boynton Hall Hedge	TA1065-11	TA125676-TA125672	Deleted LWS	1.5km NE
Thorpe Estate	TA1065-07	TA113674	Designated LWS	1.7km N
Thorpe Hall Grassland	TA1065-08	TA108673	Designated LWS	1.7km N
Gypsy Race	TA1065-15	TA024728- A178668	Candidate LWS	1.8km NE

Ancient Woodland

18. There are no sites on the Ancient Woodland Register within 5km of the proposed development, and none would be affected by it.

Other Priority Habitats

19. **Deciduous woodland** - scattered over wider area in 2km zone around the site, but none within the site itself or its likely zone of ecological influence. The closest lies 60m south-east from the site (Haisthorpe Hall).
20. **Lowland fen** - one site within 2km, 1.7km to the north-east of the proposed development, well outside the likely zone of ecological influence.

Protected Species Records (NEYEDC)

21. **Great Crested Newt** (searches included NEYEDC plus NE licence return and eDNA databases). There were no records within 2km of the site, and none within the likely zone of influence of the proposed development. No potentially suitable habitat was identified for this species within that zone either.
22. **Barn Owl** – there was one record from the NEYEDC database, outside the likely zone of influence for this species (>300m).
23. **Brown Hare**– there was a single record from the NEYEDC database (1.6km west from the proposed development) but it was seen frequently across the site during the baseline bird and other ecology surveys.
24. **Hedgehog** – there was a single record of this species 500m SE from the proposed development, but it is also likely to use the field margins within the site.
25. **Rest Harrow** (moth) *Aplasta ononaria* – there was a single record from the NEYEDC database 1.4km NW from the proposed development, but outside the likely zone of influence of the proposed development.

Field Survey Results

Extended Phase 1 Survey

26. The Extended Phase 1 survey map is shown in Figure 1. Each of the Phase 1 habitats that were recorded in the survey area are described in Table 2. The full target notes are given in Appendix 4. The survey area was predominantly arable farmland (93%).

Table 2. Phase 1 habitats recorded in the Three Oaks Renewable Energy Park survey area.

Phase 1	Habitat	Area (ha.)	% survey area
A1.1.2	Broadleaved woodland plantation	3.98	0.5%
A2.1	Scrub - dense/continuous	0.99	0.2%
B2.2	Neutral grassland - semi-improved	4.19	0.6%
B4	Improved grassland	31.37	4.3%
J1.1	Cultivated/disturbed land - arable	678.8	93.2%
J1.2	Cultivated/disturbed land - amenity grass	0.56	0.1%
J3.6	Buildings	6.65	0.9%
B4	Improved grassland	1.29	0.2%
C3.1	Tall ruderal	0.13	0.1%

27. Some of the broad-leaved woodland is UK BAP priority habitats but this is located outside the area that would be affected by the proposed development.
28. The linear habitats found within the survey area are summarised in Table 3. Their locations are shown in Figure 1. The hedgerows across all of the survey area were largely species-poor native hedgerow dominated by hawthorn.

Table 3. Phase 1 linear habitats recorded in the Three Oaks Renewable Energy Park survey area.

JNCC Code	Linear Habitat	Length (m)
J2.1.1	Species-rich hedge intact	1,640
J2.1.2	Species-poor hedge intact	26,170
J2.2.1	Species-rich hedge defunct	860
J2.2.2	Species-poor hedge defunct	1,500
J2.3.1	Species-rich hedge intact	210
G2.1	Running water - eutrophic	2,340

Protected Species Records and Habitat Suitability Assessment

29. **Badger:** signs of badger activity were found during the site surveys and there is widespread suitable habitat for this species in the survey area. As this species is subject to persecution, details of their locations are given in a Confidential Appendix (Appendix 5).
30. **Otter, Water Vole and Great Crested Newt:** there was no suitable habitat present in the survey area for any of these species.
31. **Bats:** the site has numerous trees/buildings with high bat roost potential, but these were all on the periphery of the survey area rather than within the proposed development site itself (see Figure 2 – Target Note points 1-16). The development was designed to ensure that none of these would be affected.
32. The baseline bat surveys showed the survey area to hold generally low/moderate levels of bat activity. Nine species of bat were recorded in total during the surveys. Common pipistrelle was much the most frequently recorded species, with soprano pipistrelle, Daubenton’s bat and brown long-eared bat also frequently encountered, particularly during the autumn surveys. Other less abundant species comprised: Nathusius’ pipistrelle, whiskered bat, Brandt’s bat, Natterer’s bat and noctule. Full details of the bat surveys undertaken are given in Appendix 3.
33. Given the low bat numbers within the proposed development, the lack of any effect on any bat roosting habitat, and the fact that hedgerow loss would be minimal (and any losses would be compensated by new planting), effects on bats should be negligible. In addition to that the conversion of the development site from arable farmland to wildflower meadow will enhance the bat habitat overall and should deliver a clear net gain to these species.
34. There were also regular sightings of small numbers of **brown hares** during the baseline bird and other ecology surveys.

Breeding Bird Survey Results

35. The full results of the breeding bird surveys are given in Appendix 1. The survey area supported a typical range of farmland breeding birds, including a range of NERC Act priority species. The breeding populations and their conservation value are summarised in Table 4. This included one high sensitivity species (quail) that is a Wildlife and Countryside Act Schedule 1 species, fifteen medium sensitivity species (UK BAP priority/red listed species of conservation concern; grey partridge, lapwing, cuckoo, skylark, yellow wagtail, dunnock, song thrush, starling, house sparrow, tree sparrow, linnet, bullfinch, yellowhammer, reed bunting and corn bunting), and nine low sensitivity species.

Table 4. Conservation evaluation of the breeding bird populations in the Three Oaks survey area.

Species	Peak breeding pairs (study area)	Peak breeding pairs (site + 100m buffer)	W and C Act Sch 1	Red [R]/ Amber [A] List	NERC priority sp	Value
Red-legged Partridge	7	0				Nil
Grey Partridge	10	1		R	✓	Medium
Quail	1	0	✓	A		High
Pheasant	12	0				Nil
Buzzard	2	0				Nil
Kestrel	3	1		A		Low
Lapwing	3	0		R	✓	Medium
Stock Dove	7	0		A		Low
Woodpigeon	99	16		A		Low
Collared Dove	1	0				Nil
Cuckoo	1	1		R	✓	Medium
Skylark	108	20		R	✓	Medium
Swallow	16	0				Nil
House Martin	2	0		R		Low
Meadow Pipit	14	2		A		Low
Yellow Wagtail	33	7		R	✓	Medium
Pied Wagtail	5	2				Nil
Wren	24	5		A		Low
Dunnock	28	5		A	✓	Medium
Robin	9	1				Nil
Blackbird	36	7				Nil
Song Thrush	6	0		A	✓	Medium
Blackcap	3	0				Nil
Lesser Whitethroat	6	0				Nil
Whitethroat	41	6				Nil
Chiffchaff	1	0				Nil
Willow Warbler	1	0		A		Low
Long-tailed Tit	4	0				Nil
Blue Tit	6	0				Nil
Great Tit	6	0				Nil
Jackdaw	5	1				Nil
Rook	20	0		A		Low
Carrion Crow	12	1				Nil
Starling	1	0		R	✓	Medium
House Sparrow	12	0		R	✓	Medium
Tree Sparrow	1	0		R	✓	Medium
Chaffinch	48	8				Nil
Greenfinch	4	0		R		Low
Goldfinch	19	2				Nil

Species	Peak breeding pairs (study area)	Peak breeding pairs (site + 100m buffer)	W and C Act Sch 1	Red [R]/ Amber [A] List	NERC priority sp	Value
Linnet	46	10		R	✓	Medium
Bullfinch	1	0		A	✓	Medium
Yellowhammer	44	10		R	✓	Medium
Reed Bunting	6	1		A	✓	Medium
Corn Bunting	31	8		R	✓	Medium

36. Only the breeding birds within and adjacent to the proposed development site are likely to be affected (i.e. those within the zone of ornithological influence of the development). For the purpose of this assessment this has been defined as the site plus a 100m buffer, in order to include birds that may be affected by disturbance as well as direct habitat loss. The numbers of breeding birds within this zone is given in Table 4. It did not hold any notable concentrations of any breeding birds but was generally typical of the open arable farmland habitats across the survey area.

Wintering Bird Survey Results

37. The full results of the wintering bird surveys are given in Appendix 2. The conservation value of the wintering bird populations observed in the Three Oaks survey area during the wintering bird surveys has been summarised in Table 5 below. This included eight high sensitivity species (hen harrier, red kite, golden plover, Mediterranean gull, barn owl, short-eared owl, merlin and peregrine) that are EU Birds Directive Annex 1/Wildlife and Countryside Act Schedule 1 species, four medium sensitivity species (UK BAP priority/red listed species of conservation concern; lapwing, woodcock, curlew and herring gull), and eleven low sensitivity species.

Table 5. Conservation evaluation of the autumn/winter non-breeding bird populations in the Three Oaks survey area.

Species	Mean peak count (2010-11 & 2019-20)	Mean peak in site + 100m buffer	>1% regional population	EU Birds Dir Ann 1	W and C Act Sch 1	Red [R]/ Amber [A] List	UK BAP priority sp	Value
Pink-footed Goose	17	5				A		Low
Greylag Goose	13	0				A		Low
Mallard	6	0				A		Low
Cormorant	1	0						Nil
Grey Heron	2	0						Nil
Sparrowhawk	2	0				A		Low
Hen Harrier	1	0	✓	✓	✓	R		High
Red Kite	1	0	✓	✓	✓			High
Buzzard	5	1						Nil
Golden Plover	454	0	✓	✓				High
Lapwing	375	0	✓			R	✓	Medium
Snipe	1	0				A		Low
Woodcock	1	0				R		Medium
Curlew	1	0				R	✓	Medium

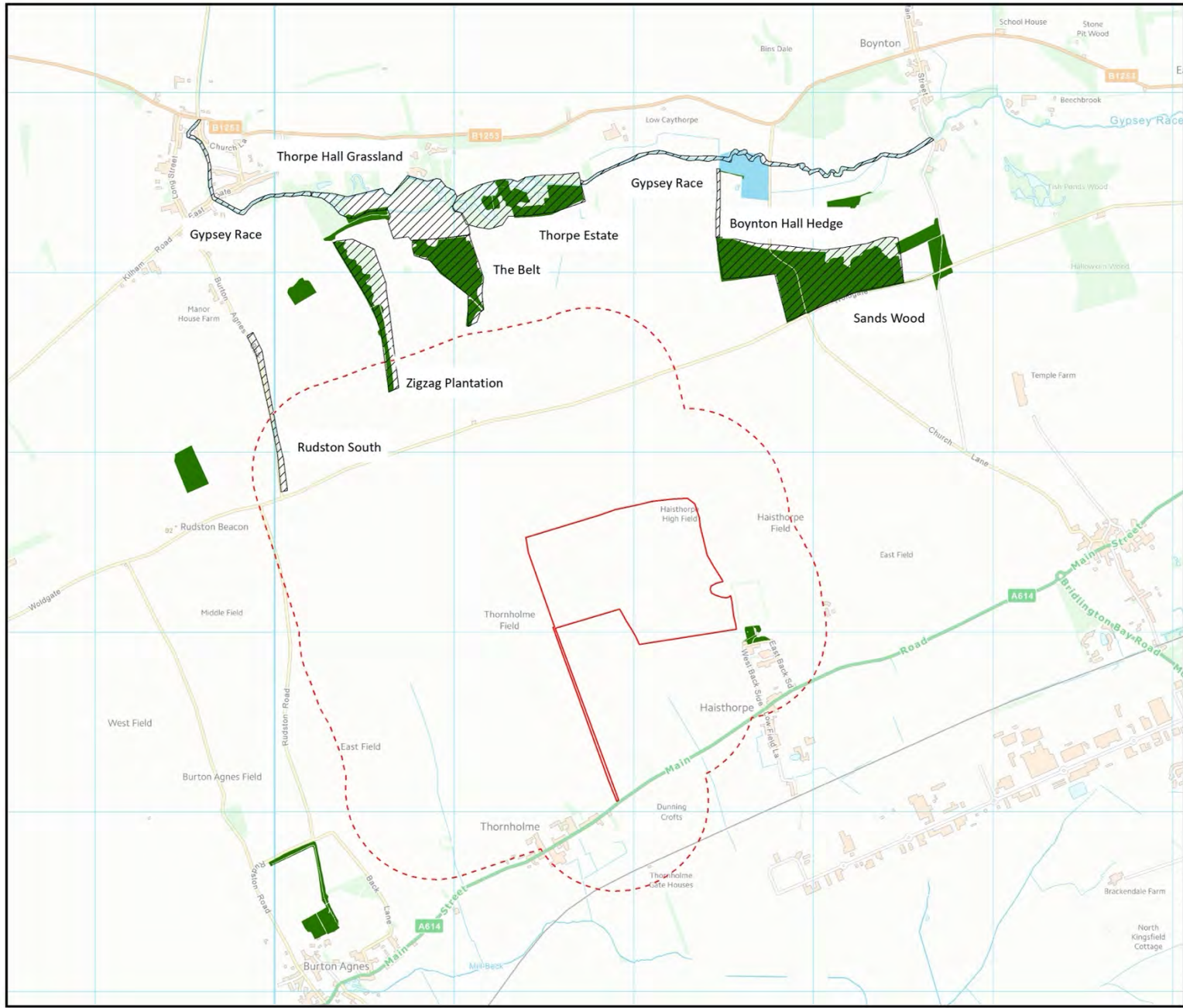
Species	Mean peak count (2010-11 & 2019-20)	Mean peak in site + 100m buffer	>1% regional population	EU Birds Dir Ann 1	W and C Act Sch 1	Red [R]/ Amber [A] List	UK BAP priority sp	Value
Black-headed Gull	546	85				A		Low
Mediterranean Gull	2	0		✓	✓	A		High
Common Gull	300	59				A		Low
Great Black-backed Gull	2	1				A		Low
Herring Gull	369	383	✓			R	✓	Medium
Lesser Black-backed Gull	6	0				A		Low
Barn Owl	1	0			✓			High
Short-eared Owl	1	0	✓	✓		A		High
Tawny Owl	1	0				A		Low
Kestrel	5	3				A		Low
Merlin	1	0	✓	✓	✓	R		High
Peregrine	1	0	✓	✓	✓			High

38. There was no evidence that the survey area (including the proposed development site) was particularly important for any wintering bird populations. No parts of that area held any notable concentrations of birds and no important wintering bird habitats occurred within it.



Three Oaks Renewable Energy Park: Ecological Assessment

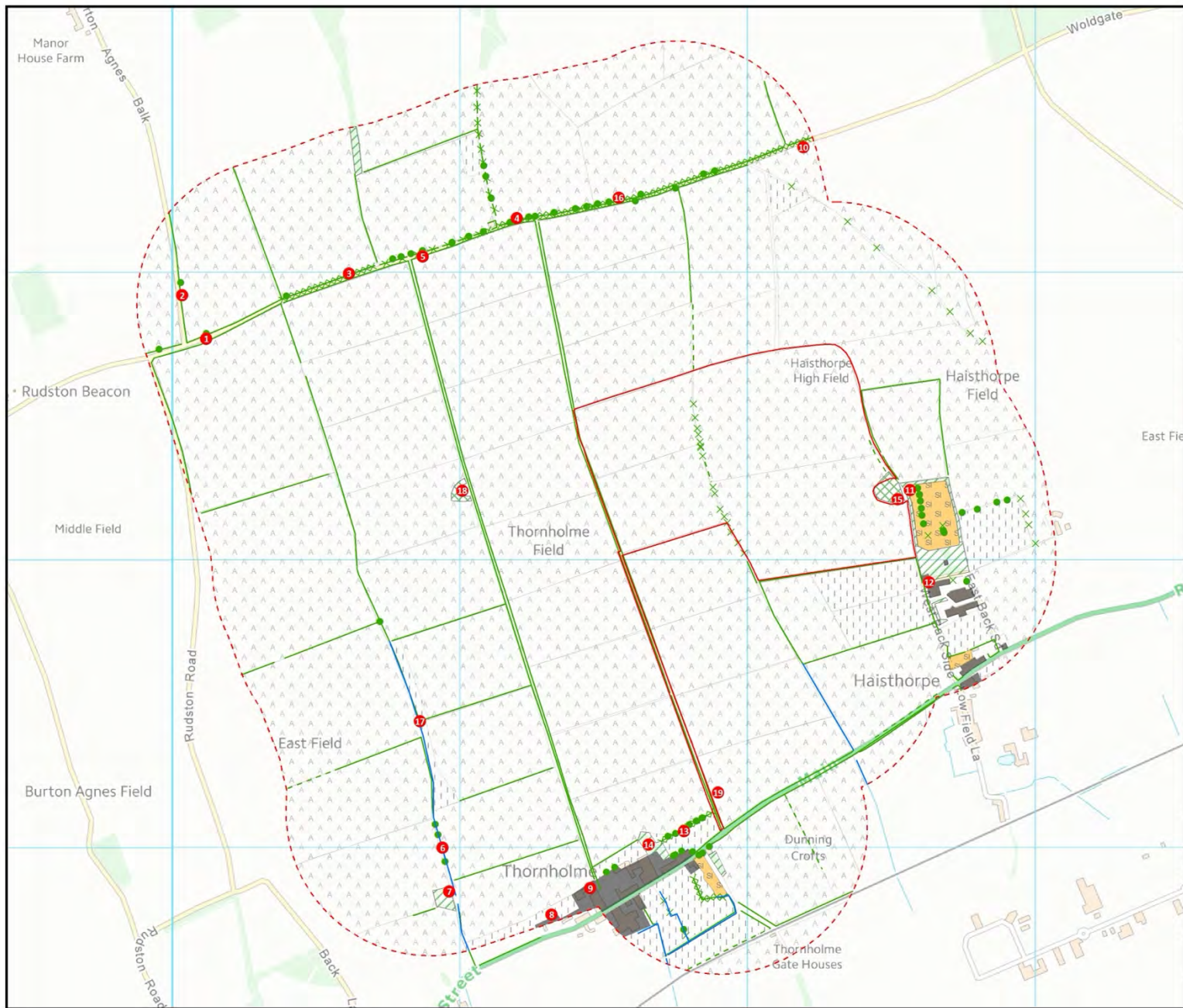
FIGURE 1
Survey Area, Local Wildlife Sites and Priority Habitats



- KEY:**
- Indicative Site Boundary & Access
 - Ecology Survey Area
 - Local Wildlife Sites
- Priority Habitats:**
- Deciduous woodland
 - Lowland fens



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Three Oaks Renewable Energy Park: Ecological Assessment

FIGURE 2

Phase 1 Habitat Map

KEY:

- Indicative Site Boundary & Access
- Three Oaks Ecology Survey Area

Phase 1 habitats:

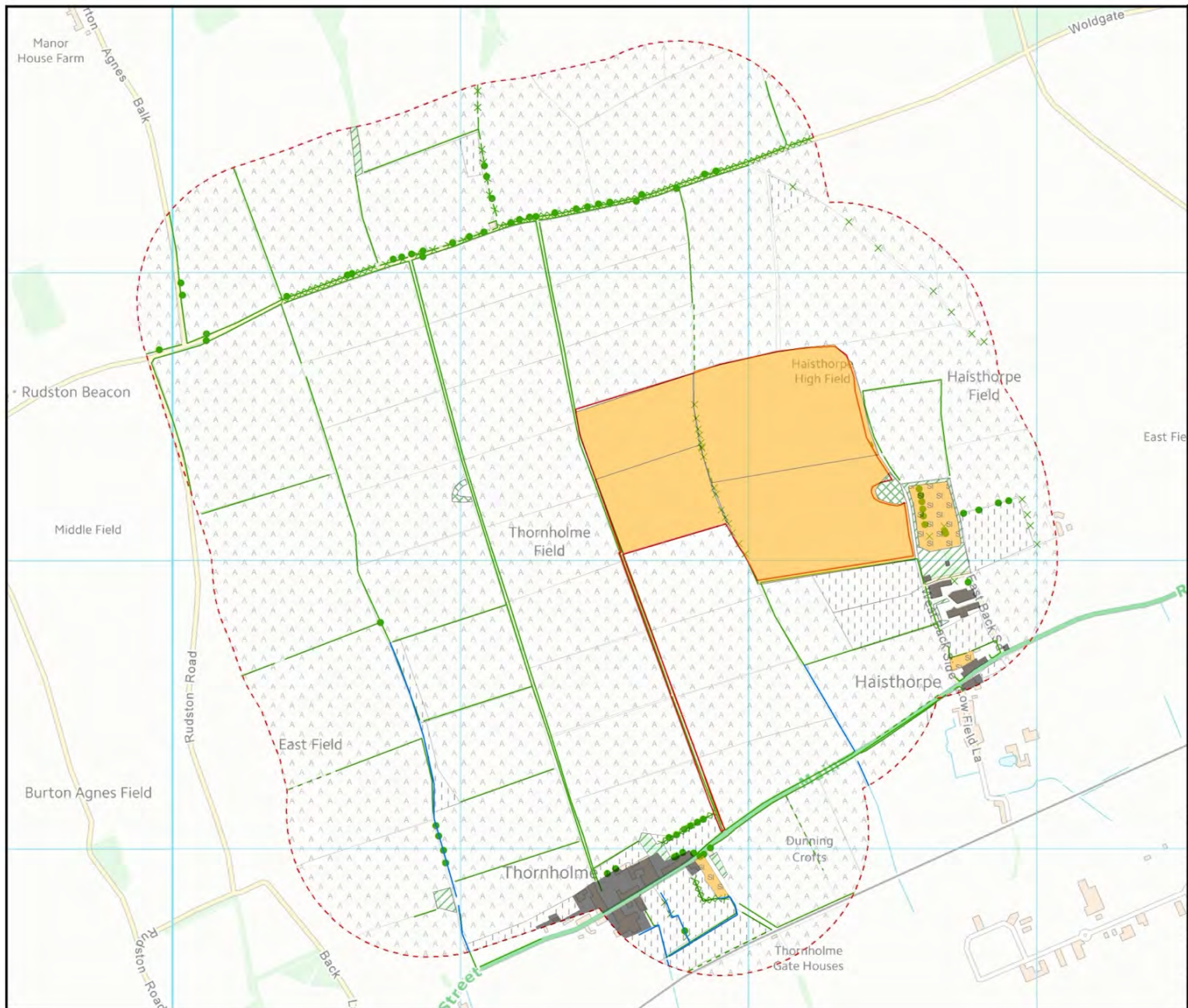
- A1.1.2 - Broadleaved woodland - plantation
- A2.1 - Scrub - dense/continuous
- B2.2 - Neutral grassland - semi-improved
- B4 - Improved grassland
- J1.1 - Cultivated/disturbed land - arable
- J3.6 - Buildings

Hedgerow:

- Species-poor hedge defunct
- Species-poor hedge intact
- Species-rich hedge defunct
- Species-rich hedge intact
- Bush
- Tree
- Drains
- Phase 1 Target Notes



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Three Oaks Renewable Energy Park: Ecological Assessment

FIGURE 3

Phase 1 Habitat Map (predicted operation)

- KEY:**
- Indicative Site Boundary & Access
- Habitat**
- A1.1.2 - Broadleaved woodland - plantation
 - A2.1 - Scrub - dense/continuous
 - B2.1 - Neutral grassland - unimproved
 - B2.2 - Neutral grassland - semi-improved
 - B4 - Improved grassland
 - J1.1 - Cultivated/disturbed land - arable
 - J3.6 - Buildings
 - ThreeOaksEcologySurveyArea
- Hedgerow:**
- Species-poor hedge defunct
 - Species-poor hedge intact
 - Species-rich hedge defunct
 - Species-rich hedge intact
 - Bush
 - Tree
 - Drains



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Renewable Energy Park Ecological Impact Assessment

39. The Renewable Energy Park has the potential to cause a range of ecological impacts including:
- Habitat loss during construction.
 - Pollution from noise, vibration, dust, surface water run-off during construction.
 - Disturbance/harm during construction.
 - Change in habitat during operational phase (dependent on the management of the site after construction).
 - Disturbance during operation (if species are displaced as a result of the presence of the solar panels and battery energy storage).
40. The extent of the development is shown in Figure 1 and summarised in Table 6. The solar panels and associated infrastructure would all be located on land that is currently arable farmland. The panels will cover 21.8ha. of the 65.8ha. total land within the site. With the solar panels raised above the ground, the land take during operation would typically be only about 5% of the site (BRE 2014).
41. There would be 1.97km (0.79ha) of new access track, a loss of 0.76ha. for the substation/battery storage and 0.01ha. for the six transformers. All of this loss would be of arable farmland. There would be a minor loss of native species-poor intact hedgerow: 40m for two passing places along the site access, another 20m at the junction of the site access with the A614 and 5m to allow access between fields within the site. All except the 5m length within the site would be replanted following construction. There would be no watercourse crossings.

Table 6. Three Oaks Renewable Energy Park: development details and habitats affected.

Description	Area/Length Affected	Habitat Type
Solar Panels	21.8ha.	Arable farmland
Substation/battery storage	0.76ha.	Arable farmland
Transformers (6)	0.01ha.	Arable farmland
New access track (4m wide)	0.79ha. (1.97km).	Arable farmland
Hedgerow removal	65m (60m of which would be restored following construction)	Native species-poor intact hedgerow

42. No statutory protected nature conservation site or Local Wildlife Sites would be affected by the proposed solar farm.

Mitigation Measures and Habitat Enhancement

Mitigation through Avoidance in Design

43. Buffers to the development have been applied to avoid the more ecologically sensitive habitats within the site. This included:
 - Minimum 30m buffer from any badger setts.
 - Minimum 5m buffer from all hedgerows.
44. The site has also been designed to minimise any loss of hedgerow by using existing breaks and farm tracks, and avoid any tree felling/damage. There would be no new watercourse crossings.

Mitigation for Breeding Birds

45. One species specially protected under Schedule 1 of the Wildlife and Countryside Act from disturbance during breeding was found during the 2020 surveys (quail), and given the habitat present it is possible that species such as barn owl could breed there in the future. It would be important to ensure that no Schedule 1 species are disturbed during the breeding season, particularly during the construction phase of the development. Given the potential to breed within the solar farm site, a Breeding Bird Protection Plan (BBPP) should be developed and implemented. This should include further surveys for Schedule 1 species at fortnightly intervals through the breeding season (March-August) during the construction period to inform the BBPP and ensure compliance with the 1981 Wildlife and Countryside Act.
46. The BBPP should also include measures to ensure the protection of all other nesting birds. Where works affecting habitats that could be used by nesting birds must take place between March and August (inclusive), they should only be carried out following an on-site check for nesting birds by an experienced ecologist, to ensure compliance with the 1981 Wildlife and Countryside Act.
47. It is likely that some breeding birds will be displaced from the site during the operational phase by the presence of the solar panels, particularly open ground species such as skylark, yellow wagtail and corn bunting. All these species are NERC Act Species of Principal Importance. Measures to deliver benefit for these species will be included as part of the Landscape and Biodiversity Mitigation and Enhancement Plan.

Mitigation for Badgers

48. The primary mitigation implemented for badgers has been to design the scheme to avoid any badger setts by a minimum 30m (and hence avoid any likely impact on them from the development), based on their current locations.
49. It is still possible that badgers could move closer to the proposed development in the intervening time before construction, so check surveys should be undertaken prior to construction (to inform the need for any mitigation measures), to include all areas within 30m of the development footprint. If any active badger setts were found to be present where they could be affected by the construction works, then further consultation would be needed with Natural England to determine the licensing and mitigation requirement.

Mitigation for Other Protected Species

50. No other protected species are likely to be affected by the development given results from the ecological surveys.

Biodiversity Net Gain Calculation Results

51. The DEFRA Biodiversity Metric 3.0 Tool was used to audit the habitats present on the site, the losses that would occur as a result of the development and the biodiversity net gain that would be achieved through the Biodiversity Management Plan.
52. Two specific habitat enhancement measures are proposed within the site boundary:
 - Restoration of **lowland meadow** – the large majority of the site is currently arable farmland of low diversity and low ecological value. This grassland will be managed after construction of the Renewable Energy Park to establish a diverse wildflower meadow plant community. The target will be to enhance 64.2ha of arable farmland to a more biodiverse neutral grassland.
 - **Native hedgerow** new planting and restoration – about 800m of new native hedgerow will be planted and a further 1,300m of hedgerow restored (planting up gaps and increasing species diversity).
 - **Ground-nesting bird plot** - provision of 0.3ha. of grassland through the central part of the site where no solar panels would be located (for ground-nesting birds including skylark, yellow wagtail and corn bunting).
53. Further details of all of these measures will be provided in the Landscape and Biodiversity Mitigation and Enhancement Plan.
54. The biodiversity net gain calculation headline results are shown in Table 7 below. Whilst there will be a small loss of habitat to the development, the proposed enhancement measures set out above will deliver a clear net gain. There will be a net 69% gain in habitat units, from 132 to 223 Biodiversity Units. Hedgerow units will increase 28% from 8.7 to 11.1 Units.
55. Ongoing management of the grassland may be carried out primarily by grazing stock (sheep). Levels of grazing would be varied through the year to optimise the wildflower meadow diversity, adopting the following regime (though to be refined as the restored grassland becomes established, informed by the monitoring programme):
 - No grazing March-June
 - Heavier grazing (5-10 sheep per ha) July – October
 - Grazing continued at a lower level (3-5 sheep/ha) through the winter (October – February) unless ground conditions too wet (in which case no grazing over-winter).
56. With regard to ongoing management of the new hedgerows, the hedges will be trimmed annually (between January and March) in the first three years after planting to encourage bush growth. Thereafter it will be trimmed once every three years. A target 3m height will be maintained through the lifetime of the renewable energy park.
57. A range of bird and bat boxes will be installed to improve the availability of nesting and roosting resources, all to be manufactured from high quality long-lasting material such as 'Woodcrete'. This will include:

- Barn owl box – one to be erected at a secure location within the site (specific location confidential to avoid disturbance to this species which is specially protected from disturbance under Schedule 1 of the 1981 Wildlife and Countryside Act).
 - Songbird nest boxes – 20 boxes of mixed type (5 x small hole for tits, 5 x larger hole for sparrows, 5 x larger boxes for starlings and 5 x open-fronted boxes for flycatchers/robins/thrushes). These will be erected on trees within existing hedgerows/field boundaries.
 - Bat boxes – 10 boxes – same locations as songbird nestboxes.
58. Measures will be implemented to ensure that mammal access routes across the site are not impeded by site fences. This will be achieved by either leaving a minimum gap of 20cm between the ground and the fence, cutting gaps at the bottom of fences to allow passage through, or installation of mammal ‘gates’.
59. In order to ensure that the Landscape and Biodiversity Mitigation and Enhancement Plan is delivering its objectives and that a net gain is being achieved, an ecological monitoring programme will be implemented. This will include an annual visit to assess the site’s habitat condition, in years 1-3, 5, 10 and 15 of operation. During each visit the condition of the site’s habitats will be assessed, and recommendations made to fine-tune the future management of the site.
60. Additionally, breeding bird surveys will be carried out to inform the implementation of the Landscape and Biodiversity Mitigation and Enhancement Plan. Surveys will follow the same methodology as the baseline surveys carried out in 2020 (so they will be directly comparable) and will be undertaken during the first three years of the operation of the renewable energy park. After that the results will be reviewed and the surveys discontinued as long as the Landscape and Biodiversity Mitigation and Enhancement Plan has delivered the required net gain to the local breeding bird population. If not then measures to improve the site’s management will be recommended and the survey continued in years 5, 10 and 15.

Table 7. Biodiversity Net Gain Headline Results

Three Oaks Renewable Energy Park		Return to results menu	
Headline Results			
On-site baseline	<i>Habitat units</i>	131.60	
	<i>Hedgerow units</i>	8.66	
	<i>River units</i>	0.00	
On-site post-intervention <small>(Including habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	222.69	
	<i>Hedgerow units</i>	11.06	
	<i>River units</i>	0.00	
On-site net % change <small>(Including habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	69.22%	
	<i>Hedgerow units</i>	27.66%	
	<i>River units</i>	0.00%	
Off-site baseline	<i>Habitat units</i>	0.00	
	<i>Hedgerow units</i>	0.00	
	<i>River units</i>	0.00	
Off-site post-intervention <small>(Including habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	0.00	
	<i>Hedgerow units</i>	0.00	
	<i>River units</i>	0.00	
Total net unit change <small>(including all on-site & off-site habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	91.09	
	<i>Hedgerow units</i>	2.40	
	<i>River units</i>	0.00	
Total on-site net % change plus off-site surplus <small>(including all on-site & off-site habitat retention, creation & enhancement)</small>	<i>Habitat units</i>	69.22%	
	<i>Hedgerow units</i>	27.66%	
	<i>River units</i>	0.00%	
Trading rules Satisfied?	Yes		

Conclusions

61. The proposed Renewable Energy Park will not have any effect on any statutory protected nature conservation sites. No Local Wildlife Sites would be affected, nor any NERC Act priority habitat.
62. The Renewable Energy Park is located on arable farmland, and this is the only habitat that would be lost to the development (other than a small 5m loss of native species-poor hedgerow). There will be no need for any tree felling, or any watercourse crossings.
63. Mitigation measures will be required during construction to avoid any significant impacts on breeding birds, through the implementation of a Breeding Bird Protection Plan.
64. Pre-construction survey checks will also be required for badgers, to inform any additional mitigation for this species (in case they have moved into the site prior to construction).
65. A Biodiversity Management Plan will deliver a net gain of 69% in habitat units and 28% hedgerow units.
66. Overall, with the proposed mitigation in place, there would be no significant residual ecological effects from the proposed solar farm.

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Appendix 1. Breeding Bird Report

Three Oaks Renewable Energy Park: Breeding Bird Survey 2020

Report to Ridge Clean Energy

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THREE OAKS RENEWABLE ENERGY PARK BREEDING BIRD SURVEYS 2020

Introduction

1. This report presents the results of bird survey work at the proposed Three Oaks Renewable Energy Park, Thornholme, East Yorkshire, undertaken during the breeding season to provide ornithological baseline data for the proposed development. It provides baseline data on the breeding bird populations, activity and flight paths within the vicinity of the proposed development site to inform subsequent ornithological impact assessment.
2. The specific objectives of this work were to:
 - Undertake breeding bird surveys of the proposed development site, to determine the numbers of birds present, and the flight activity of key target species.
 - Use this information to evaluate the importance of the site's breeding bird populations.
3. The surveys were designed to take into account Natural England (NE) standing advice¹ and Scottish Natural Heritage (2017) bird survey guidance. The surveys were undertaken by Tom Lowe and Stuart Piner, both highly experienced bird surveyors.
4. A previous application was submitted for a wind farm at this site in 2011, though was unsuccessful. The baseline surveys from 2010 for that application have been included in this report for comparison with the 2020 data.

Study Area

5. The site is located approximately 1km north of Thornholme village and 5km west-south-west from Bridlington in East Yorkshire. The breeding bird survey area was chosen to include all areas within the potential zone of ornithological influence of the renewable energy park and a buffer around that to be contextual information on the area's breeding birds. The survey area covered a total area of 6.4km² (see Figure 1). It is predominantly open arable farmland and lies within the 'Yorkshire Wolds' NE Natural Area.

Breeding Bird Survey Methods

Core Breeding Bird Surveys

6. The main breeding bird surveys are following the standard Common Birds Census methodology with four surveys undertaken at approximately monthly intervals during April-July 2020. They were carried out on 15 April, 8 May, 4 June and 5 July 2020.
7. All bird locations and behaviour were mapped to 1:10,000 scale, using the standard 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. A route was chosen to ensure that all parts of the study area are covered to within at least 100m of the observer. The survey route was plotted onto the survey map as it was carried out. 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 was used to record the birds'

¹ <https://www.gov.uk/guidance/wild-birds-surveys-and-monitoring-for-onshore-wind-farms>

activities; singing, calling, carrying nest material, nests or young found, repetitively alarmed adults, disturbance displaying, carrying food or in territorial dispute.

8. The survey data were analysed to determine spatially distinct clusters of records, equivalent to breeding territories (following standard Common Birds Census methodology, Gilbert *et al.* 1998), with the number of such territories used to calculate the breeding population for each species. A record in potentially suitable breeding habitat on a single visit was considered sufficient to indicate a potential breeding attempt.

Raptor and Owl Breeding Surveys

9. As the survey area may be used by a range of scarce raptors and owls, species-specific surveys of a wider buffer around the proposed development site was undertaken for key species during April-August 2020. These surveys comprised walkovers (where access was allowed and where potentially suitable breeding habitat for these species was present) supplemented by a series of mini-vantage points (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). These surveys recorded all Schedule 1 and Annex I raptor species including marsh harrier, peregrine and barn owl. This included five survey visits, undertaken on 23 April, 21 May, 18 June, 22 July and 18 August 2020.

Breeding Season Vantage Point Surveys

10. These surveys enabled flight activity at the proposed development site to be quantified and inform the project impact assessment (SNH 2017). A single vantage point was sufficient, which gave a clear view over the site to a maximum 2km viewing distance, looking forward from the VP (i.e. no need to look behind). A total of 36 hours surveys were carried out from the VP (including roost flight observations at dawn/dusk and around high tide), over the April-September 2020 survey period (surveys were continued through to September to give a full year of survey data). All flight lines of target species were mapped, and the flight height of each flock recorded. Target species comprised:
 - All ducks, geese, swans, cormorants, herons, coot and grebes;
 - All waders (including lapwing and golden plover);
 - All birds of prey and owls;
 - Large flocks (>100 birds) of other species (except woodpigeon and rook);
 - Any other notable species.
11. The VP was selected using the following criteria:
 - It gave a clear view across the development site, with all of the site within 2km of the VP visible as a minimum;
 - The survey area could be observed by looking in a 180° arc forward from the vantage point (i.e. no need for the observer to look behind to cover the site) - the focus of the surveys was looking into the development site from the VP.
12. All key birds seen were recorded, irrespective of their distance from the vantage point. Observations were carried out throughout daylight hours but not in periods of reduced visibility (<3km).
13. Vantage point surveys were carried out for a maximum of 3 hours in a single observer session. Where one surveyor carried out two three-hour blocks concurrently, there was a gap of at least 30 minutes rest period between these surveys (to follow best practice).

14. During the observation periods, all target species flights were mapped and cross-referenced to the recording form using a numbering system, and the flight height of each recorded. To estimate flight height as accurately as possible, the available reference features (e.g. existing power lines, radio masts) were used. Flight heights were recorded as accurately as possible, i.e. not summarised to height classes. Below 10m it was possible to estimate to 1m, between 10m and 20m to 2m, between 20m and 50m to 5m, and above 50m to 10m. In any case of uncertainty an estimate of the upper and lower range of height was recorded. When birds were observed over an extended period, estimates of flight height should be recorded every 30 seconds. The activity during each flight (e.g. striking prey, displaying, food passing) was also recorded.

Breeding Bird Surveys 2020: Results

15. The breeding bird populations recorded in the survey area on each visit are summarised in Table 1, which gives the number of breeding pairs recorded during each survey visit and the overall breeding population estimate for each species. A single record in potentially suitable breeding habitat on a single visit was considered sufficient to indicate a potential breeding attempt.

Table 1. Breeding bird numbers in the Three Oaks survey area recorded during April-July 2020. Numbers given are the number of breeding pairs recorded on each survey visit, the overall number of breeding pairs and the number of pairs within the proposed development.

Species	15 April	8 May	4 June	5 July	Number of breeding pairs	Number of pairs within solar site
Red-legged Partridge	1	3	1	3	5	0
Grey Partridge	4	6	4	3	9	1
Pheasant	2	4	4	1	7	0
Buzzard	1	1	2	1	2	0
Kestrel	2	1	0	0	3	0
Lapwing	0	1	0	0	1	0
Stock Dove	0	1	1	0	2	0
Woodpigeon	5	12	20	24	54	0
Cuckoo	0	0	0	1	1	1
Skylark	70	68	65	43	108	10
Swallow	0	1	1	1	3	0
House Martin	0	0	2	0	2	0
Meadow Pipit	3	1	2	0	7	1
Yellow Wagtail	2	17	14	10	30	5
Pied Wagtail	4	1	0	0	5	1
Wren	15	10	5	3	24	0
Dunnock	13	6	3	3	22	0
Robin	4	5	2	0	9	0
Blackbird	15	6	16	8	26	0
Song Thrush	0	0	1	0	1	0
Blackcap	0	1	0	3	3	0
Lesser Whitethroat	0	4	2	0	6	0
Whitethroat	1	36	14	13	40	1
Long-tailed Tit	0	2	1	1	4	0
Blue Tit	2	3	0	1	5	0
Great Tit	2	2	3	2	6	0
Jackdaw	0	3	2	1	4	0
Rook	20	0	0	0	20	0

Species	15 April	8 May	4 June	5 July	Number of breeding pairs	Number of pairs within solar site
Carrion Crow	9	4	5	2	12	1
House Sparrow	0	0	0	1	1	0
Tree Sparrow	0	0	0	1	1	0
Chaffinch	32	31	29	14	48	1
Goldfinch	2	4	5	8	12	0
Linnet	16	26	17	18	46	2
Yellowhammer	13	20	31	21	44	3
Reed Bunting	3	0	1	2	6	1
Corn Bunting	16	19	20	8	31	2

16. The breeding bird populations within the survey area in 2020 are compared with those from a previous survey in 2010 in Table 2. Generally, the breeding bird populations were very similar between the two years.

Table 2. Breeding bird populations in the Three Oaks survey area during 2010 and 2020 (estimated numbers of breeding pairs).

Species	Estimated number of breeding pairs	
	2010	2020
Red-legged Partridge	7	5
Grey Partridge	10	9
Quail	1	0
Pheasant	12	7
Buzzard	1	2
Kestrel	2	3
Lapwing	3	1
Stock Dove	7	2
Woodpigeon	99	54
Collared Dove	1	0
Cuckoo	1	1
Skylark	104	108
Swallow	16	3
House Martin	2	2
Meadow Pipit	14	7
Yellow Wagtail	33	30
Pied Wagtail	3	5
Wren	12	24
Dunnock	28	22
Robin	5	9
Blackbird	36	26
Song Thrush	6	1
Blackcap	1	3
Whitethroat	41	40
Chiffchaff	1	0
Willow Warbler	1	0
Long-tailed Tit	2	4
Blue Tit	6	5
Great Tit	5	6
Jackdaw	5	4
Rook	3	20
Carrion Crow	5	12
Starling	1	0
House Sparrow	12	1

Species	Estimated number of breeding pairs	
	2010	2020
Tree Sparrow	1	1
Chaffinch	48	48
Greenfinch	4	0
Goldfinch	19	12
Linnet	41	46
Bullfinch	1	0
Yellowhammer	33	44
Reed Bunting	4	6
Corn Bunting	14	31

Vantage Point Survey Results

17. The rates of bird flight movement observed across the survey area during the vantage point surveys from the single VP are summarised in Table 3. This gives the monthly mean flight rates per hour observed, and the total number of flights recorded during the survey period.

Table 3. Bird flight rates recorded over the Three Oaks breeding bird survey area during April – September 2020 vantage point surveys. N = 36 hours total observation (6 hours/month).

Species	Flight rate (birds/hour)						Total number of flights
	Apr	May	Jun	Jul	Aug	Sep	
Barnacle Goose	0	0.3	0	0	0	0	2
Honey-buzzard	0	0	0	0	0	0.2	1
Marsh Harrier	0	0.2	0	0.3	1.0	0.3	11
Sparrowhawk	0	0	0	0	0.7	0.5	7
Buzzard	2.0	0.7	1.8	0.3	3.3	4.0	73
Kestrel	0.3	0.2	0.5	0	1.0	1.2	19
Merlin	0.2	0	0	0	0.2	0	2
Hobby	0	0	0	0	0	0.2	1
Golden Plover	0	0	0	0	5.8	0	35
Lapwing	0	0.2	0	0	0	0	1
Common Gull	0	0	0	0	0	3.3	20
Lesser Black-backed Gull	0.3	1.8	1.0	2.0	0.3	0	33
Herring Gull	56.8	27.8	2.3	5.0	30.8	93.7	1299
Great Black-backed Gull	0	0	0	0	0.2	0	1
Black-headed Gull	0	0	0	0	0	4.3	26

18. Table 4 shows a comparison of the flight rates recorded in 2020 with those in the previous autumn/winter surveys in 2010. The key species seen over the two breeding seasons were similar, with gulls being the most numerous group in both years (particularly herring gull).

Table 4. Comparison of key species flight rates (birds/hour) recorded over the Three Oaks breeding bird survey area during the 2010 and 2020 vantage point surveys.

Species	Mean flight rate (birds/hour)		Total flights observed	
	2010	2020	2010	2020
Barnacle Goose	0	0.06	0	2
Cormorant	0.11	0.00	4	0
Honey-buzzard	0	0.03	0	1
Marsh Harrier	0	0.31	0	11
Sparrowhawk	0.03	0.19	1	7
Buzzard	0.22	2.03	8	73
Kestrel	0.44	0.53	16	19
Merlin	0	0.06	0	2
Hobby	0.03	0.03	1	1
Oystercatcher	0.11	0.00	4	0
Golden Plover	0.64	0.97	23	35
Lapwing	1.22	0.03	44	1
Curlew	0.03	0.00	1	0
Common Gull	0	0.56	0	20
Lesser Black-backed Gull	0.19	0.92	7	33
Herring Gull	18.31	36.08	659	1299
Great Black-backed Gull	0.33	0.03	12	1
Black-headed Gull	0.33	0.72	12	26

Conservation Evaluation of Breeding Bird Populations

19. The conservation value of the non-breeding bird populations was determined using the criteria specified in Table 5 (from Percival 2007). This includes the criteria adopted by Natural England 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 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 (Frost *et al.* 2021 and Brides *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 and NERC Act Section 41 priority species were all considered in the evaluation process.

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

Sensitivity	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. NERC Act Section 41 priority species (if not covered above), red-listed species of conservation concern.
LOW	Any other species of conservation interest, e.g. species listed on the Birds of Conservation Concern not covered above. Local BAP species (if not covered above).

20. The conservation value of the breeding bird populations observed in the Three Oaks survey area during the breeding bird surveys has been summarised in Table 6 below. This included one high sensitivity species (quail) that is a Wildlife and Countryside Act Schedule 1 species, fifteen medium sensitivity species (UK BAP priority/red listed species of conservation concern; grey partridge, lapwing, cuckoo, skylark, yellow wagtail, dunnock, song thrush, starling, house sparrow, tree sparrow, linnet, bullfinch, yellowhammer, reed bunting and corn bunting), and nine low sensitivity species.

Table 6. Conservation evaluation of the breeding bird populations in the Three Oaks Renewable Energy Park survey area.

Species	Peak breeding pairs	EU Birds Dir Ann 1	W and C Act Sch 1	Red [R]/ Amber [A] List	NERC priority sp	Value
Red-legged Partridge	7					Nil
Grey Partridge	10			R	✓	Medium
Quail	1		✓	A		High
Pheasant	12					Nil
Buzzard	2					Nil
Kestrel	3			A		Low
Lapwing	3			R	✓	Medium
Stock Dove	7			A		Low
Woodpigeon	99			A		Low
Collared Dove	1					Nil
Cuckoo	1			R	✓	Medium
Skylark	108			R	✓	Medium
Swallow	16					Nil
House Martin	2			R		Low
Meadow Pipit	14			A		Low
Yellow Wagtail	33			R	✓	Medium
Pied Wagtail	5					Nil
Wren	24			A		Low
Dunnock	28			A	✓	Medium
Robin	9					Nil
Blackbird	36					Nil

Species	Peak breeding pairs	EU Birds Dir Ann 1	W and C Act Sch 1	Red [R]/ Amber [A] List	NERC priority sp	Value
Song Thrush	6			A	✓	Medium
Blackcap	3					Nil
Lesser Whitethroat	6					Nil
Whitethroat	41					Nil
Chiffchaff	1					Nil
Willow Warbler	1			A		Low
Long-tailed Tit	4					Nil
Blue Tit	6					Nil
Great Tit	6					Nil
Jackdaw	5					Nil
Rook	20			A		Low
Carrion Crow	12					Nil
Starling	1			R	✓	Medium
House Sparrow	12			R	✓	Medium
Tree Sparrow	1			R	✓	Medium
Chaffinch	48					Nil
Greenfinch	4			R		Low
Goldfinch	19					Nil
Linnet	46			R	✓	Medium
Bullfinch	1			A	✓	Medium
Yellowhammer	44			R	✓	Medium
Reed Bunting	6			A	✓	Medium
Corn Bunting	31			R	✓	Medium

21. The distributions of the breeding birds of conservation value within the survey area in April-July 2020 are shown on Figures 2 to 9. The more abundant species (i.e. 10 or more records) have been presented separately for clarity.
- Skylark (Figure 2) were abundant and evenly distributed across all of the open arable habitats across the survey area, including within the proposed development site.
 - Yellow wagtail (Figure 3) were also found widely on arable land in the buffer area including within the proposed development site.
 - Wren (Figure 4) were breeding in scrub and hedgerows across the survey area.
 - Dunnock (Figure 5) was another species of the hedgerow and woodland habitats, with none recorded within the proposed development site itself.
 - Linnet (Figure 6) were widely distributed across the survey area, associated mainly with scrub and hedgerow habitats.
 - Yellowhammer (Figure 7) was another predominantly hedgerow/scrub species.
 - Corn Bunting (Figure 8) were widely distributed across the open arable farmland, though with fewer records in the southern part of the survey area.
22. Other less abundant species of conservation value (Figure 9) were widely scattered across the survey area, with no particular concentrations. The location of the quail has not been plotted as this species is specially protected under Schedule 1 of the Wildlife and Countryside Act. It was not recorded, however, within the potential impact zone of the development.
23. The evaluation of the conservation importance of the non-breeding species observed during these surveys is given in Table 7. This included six high value species (barnacle goose, honey-buzzard, marsh harrier, merlin, hobby and golden plover, EU Annex 1/Wildlife and Countryside Act Schedule 1 species), one medium value (herring gull, a NERC Act priority species), eight additional low value species (through their red/amber listing). All these species were seen only

infrequently in generally low numbers during the breeding bird surveys. No important concentrations of flight activity were observed.

Table 7. Conservation evaluation of the non-breeding bird populations in the Three Oaks Renewable Energy Park survey area, April-September 2020.

Species	Peak count	EU Annex 1	W&C Sch 1	Red [R]/ Amber [A] List sp	UK BAP sp.	Conservation value
Barnacle Goose	2	✓		A		High
Honey-buzzard	1	✓	✓	A		High
Cormorant	1					Nil
Marsh Harrier	1	✓	✓			High
Sparrowhawk	1			A		Low
Merlin	1	✓	✓	R		High
Hobby	1		✓			High
Golden Plover	15	✓				High
Common Gull	12			A		Low
Lesser Black-backed Gull	8			A		Low
Herring Gull	220			R	✓	Medium
Great Black-backed Gull	1			A		Low
Black-headed Gull	20			A		Low
Swift	25			R		Low
House Martin	1			R		Low
Wheatear	1			A		Low

Conclusions

24. The survey area supports a typical range of farmland breeding birds, including a range of NERC priority species. One species specially protected under Schedule 1 of the Wildlife and Countryside Act from disturbance during breeding was found during the 2022 surveys, quail, and given the habitat present it is possible that others such as hobby and barn owl could breed there in the future. It would be important to ensure that no Schedule 1 species are disturbed during the breeding season, particularly during the construction phase of the development. Given the potential to breed at the proposed development site, a Breeding Bird Protection Plan (BBPP) should be developed and implemented. This should include further surveys for Schedule 1 species at fortnightly intervals through the breeding season (March-August) for the construction period to inform the BBPP and ensure compliance with the 1981 Wildlife and Countryside Act, if any construction works were to take place at that time.
25. The BBPP should also include measures to ensure the protection of all other nesting birds. Where works affecting habitats that could be used by nesting birds must take place between March and August (inclusive), they should only be carried out following an on-site check for nesting birds by an experienced ecologist, to ensure compliance with the 1981 Wildlife and Countryside Act.
26. It is likely that some breeding birds will be displaced from the site during the operational phase by the presence of the solar panels, particular open ground species such as lapwing, skylark and yellow wagtail. These are NERC Act Species of Principal Importance. Measures to deliver net gain for these species will be delivered as part of the Biodiversity Management Plan for the proposed renewable energy park.

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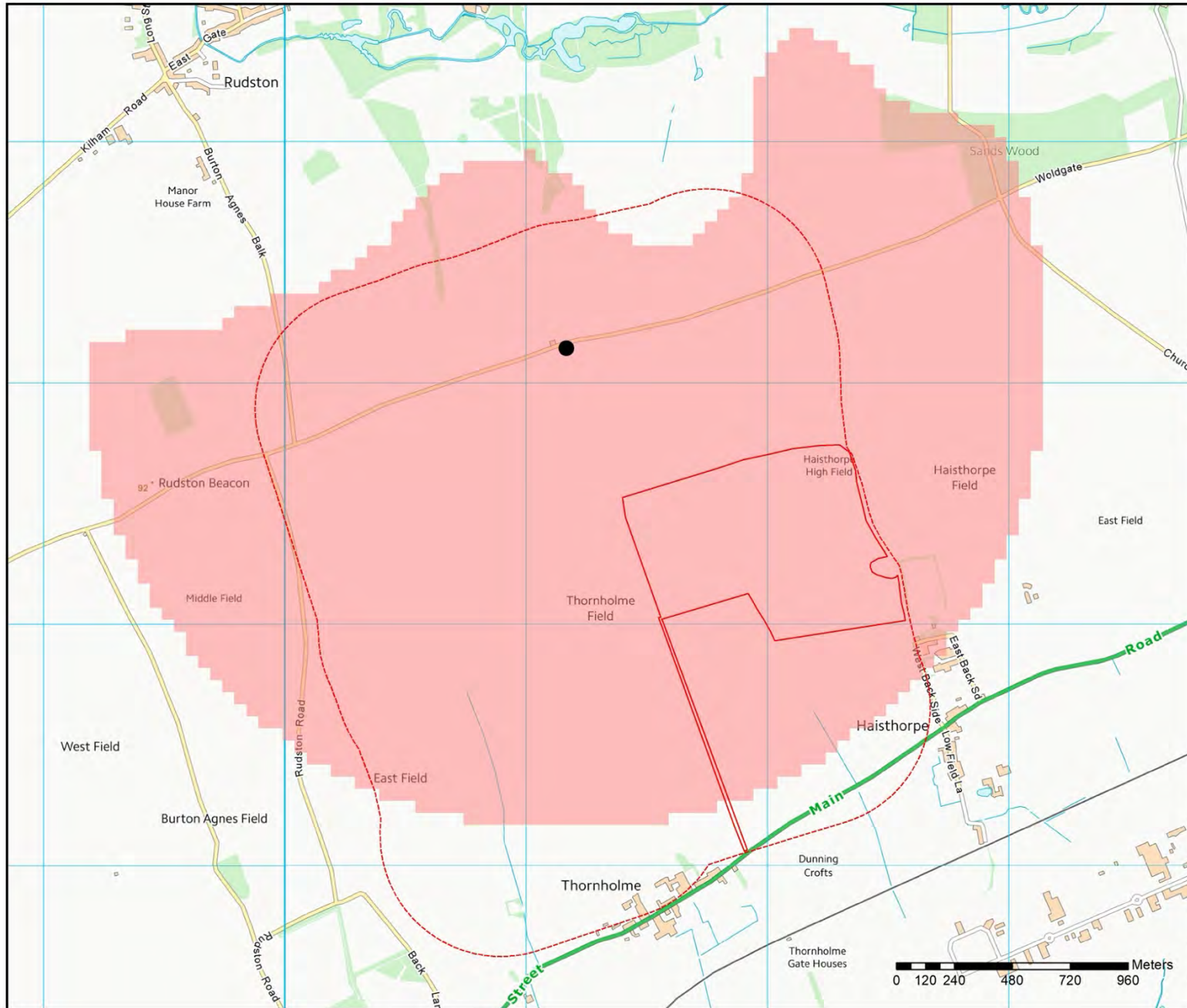
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Three Oaks Renewable Energy Park: Breeding Bird Surveys 2020

FIGURE 1
Bird Survey Area

KEY:

- Indicative Site Boundary & Access
- Breeding Bird Survey Area
- VP location
- Viewshed (20m above ground to 2km)



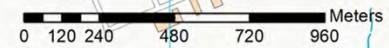
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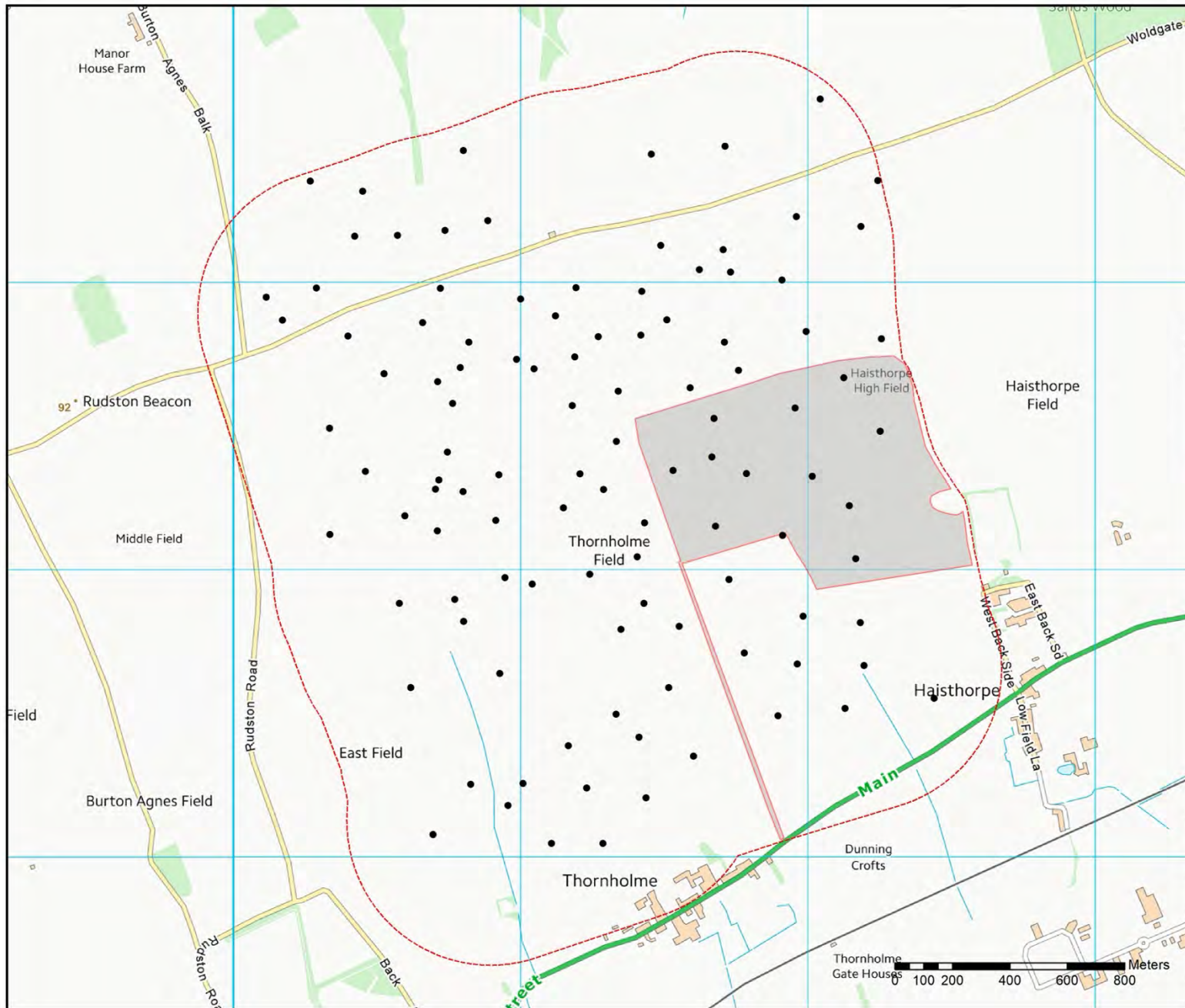
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ISSUE NO.	n/a		

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**BIRD SURVEYS
BREEDING 2020**

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Three Oaks Renewable Energy Park: Breeding Bird Surveys 2020

FIGURE 2
Distribution of Breeding Skylark

- KEY:**
- Approx. breeding locations
 - █ Indicative Site Boundary & Access
 - ▭ Breeding Bird Survey Area



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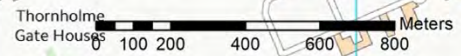
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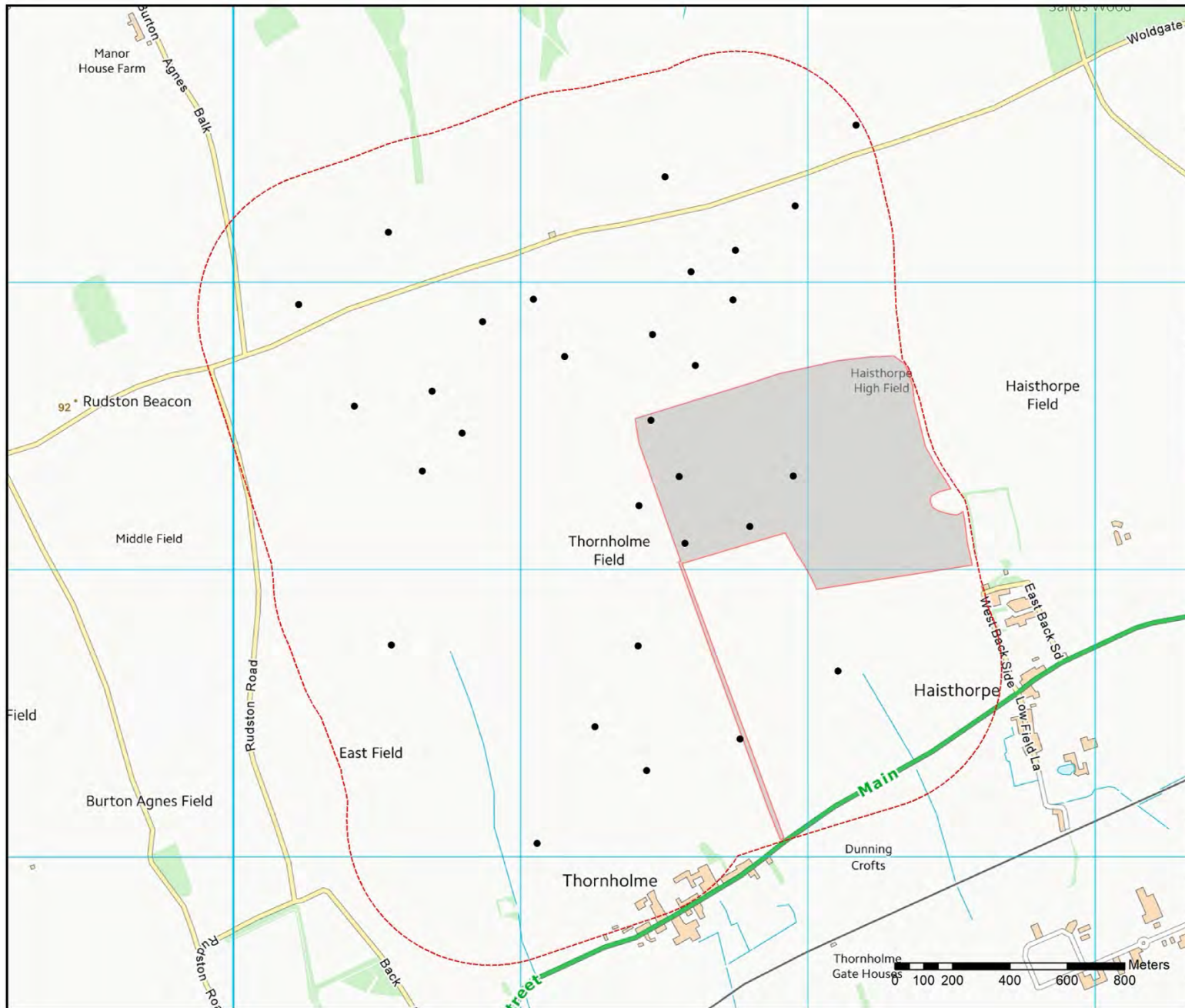
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Three Oaks Renewable Energy Park: Breeding Bird Surveys 2020

FIGURE 3
Distribution of Breeding Yellow Wagtail

- KEY:**
- Approx. breeding locations
 - █ Indicative Site Boundary & Access
 - ▭ Breeding Bird Survey Area



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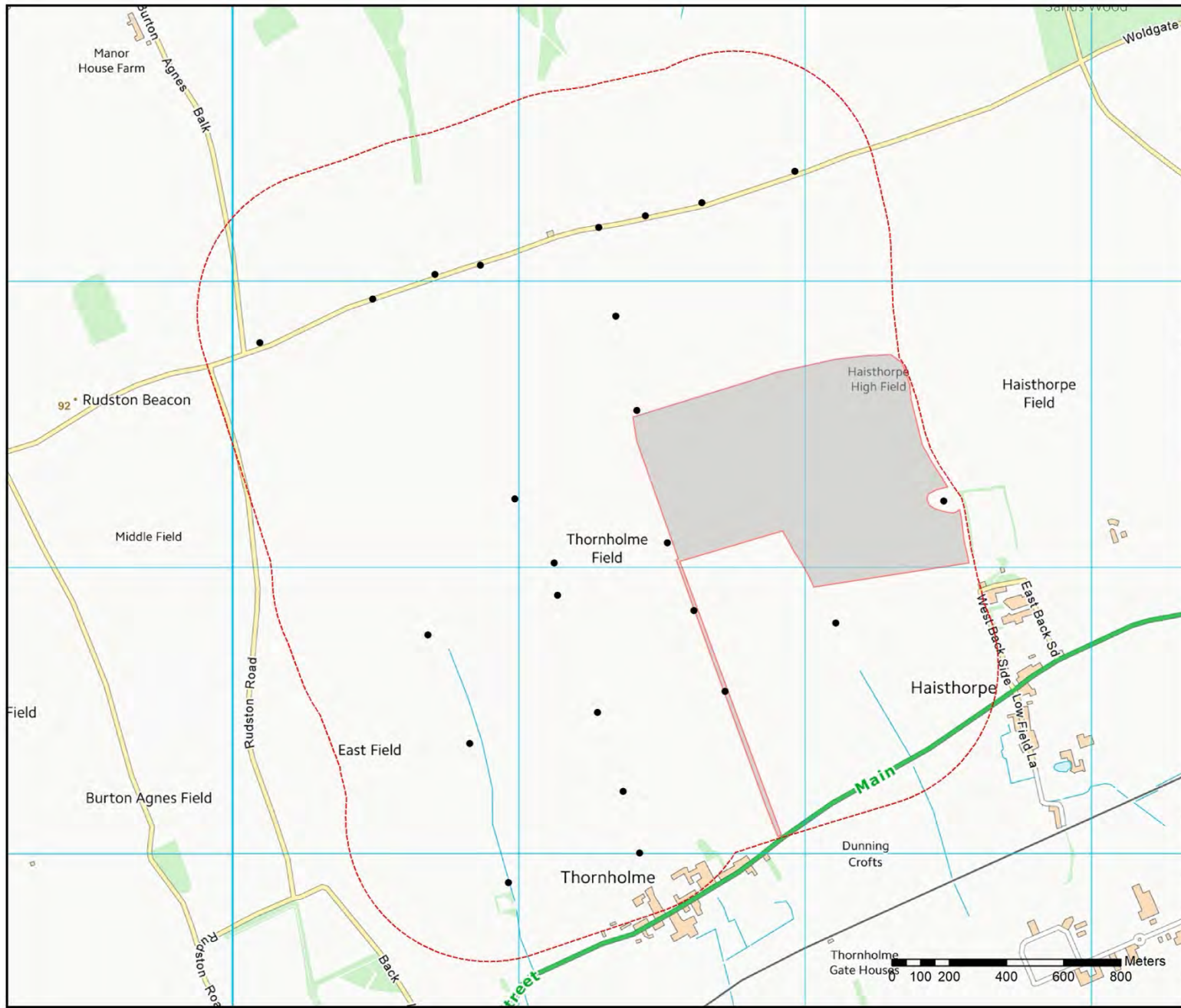
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Three Oaks Renewable Energy Park: Breeding Bird Surveys 2020

FIGURE 4
Distribution of Breeding Wren

- KEY:**
- Approx. breeding locations
 - █ Indicative Site Boundary & Access
 - ▭ Breeding Bird Survey Area



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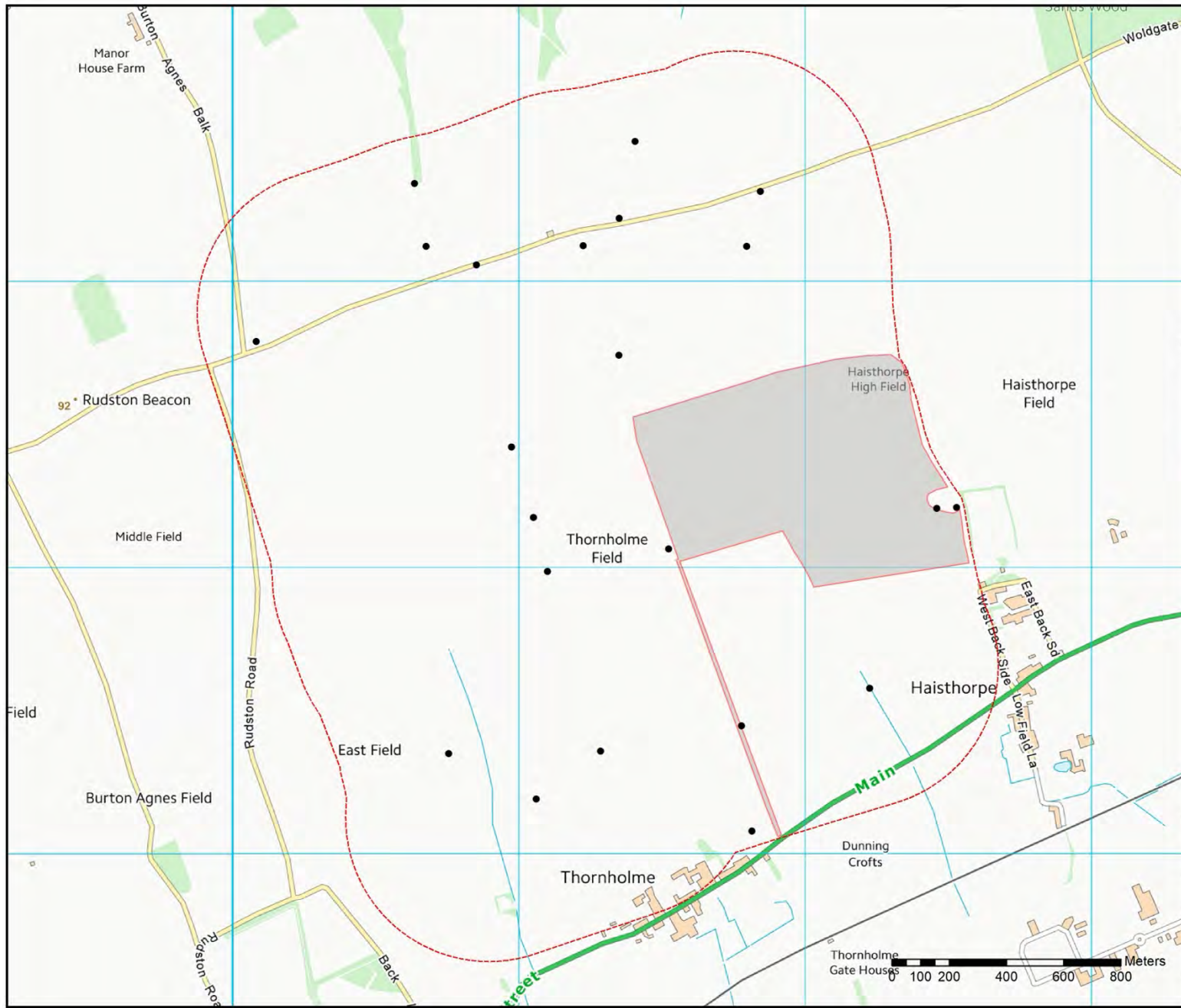
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Three Oaks Renewable Energy Park: Breeding Bird Surveys 2020

FIGURE 5
Distribution of Breeding Dunnock

- KEY:**
- Approx. breeding locations
 - Indicative Site Boundary & Access
 - ▭ Breeding Bird Survey Area



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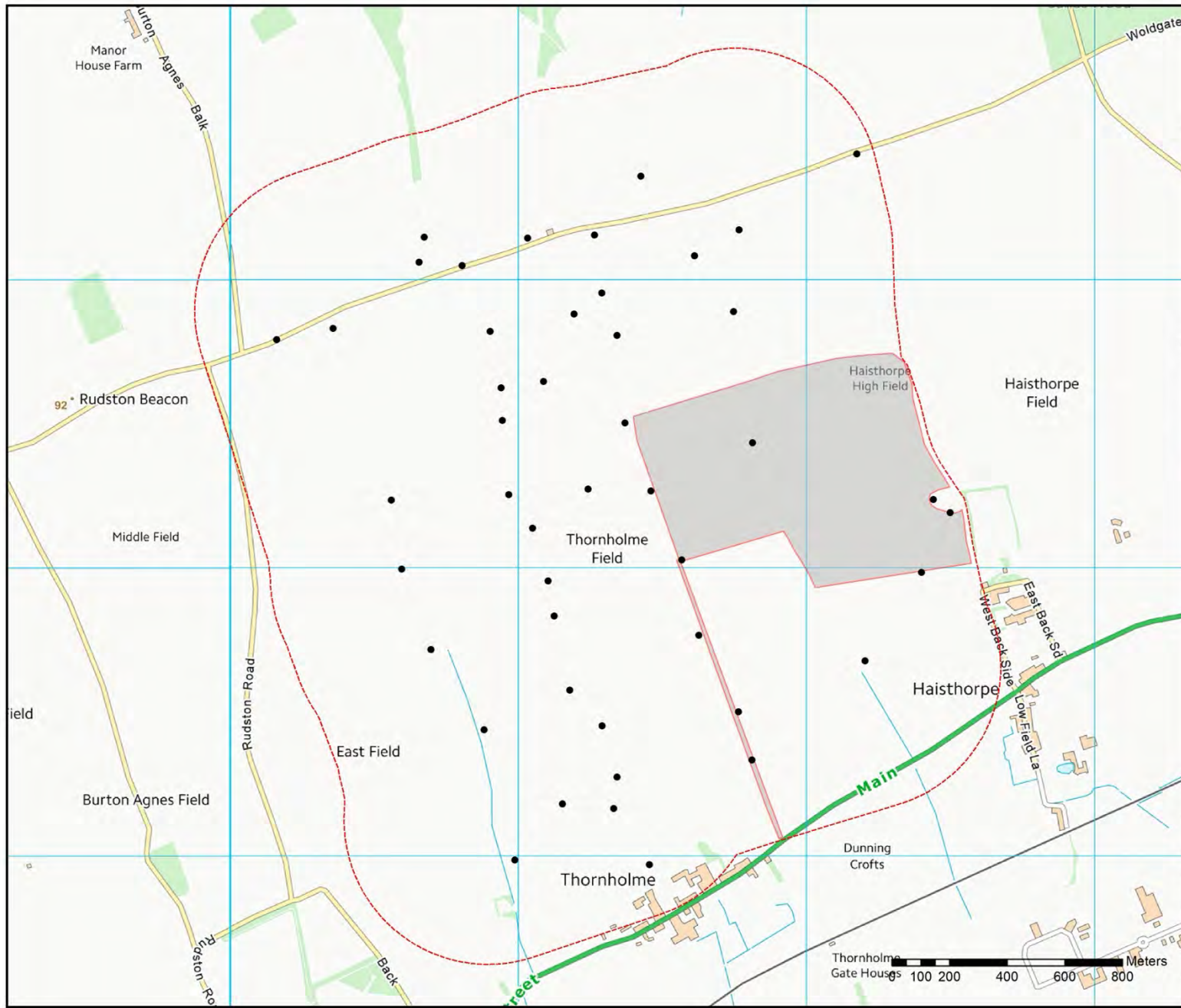
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Three Oaks Renewable Energy Park: Breeding Bird Surveys 2020

FIGURE 6
Distribution of Breeding Linnet

- KEY:**
- Approx. breeding locations
 - Indicative Site Boundary & Access
 - ▭ Breeding Bird Survey Area



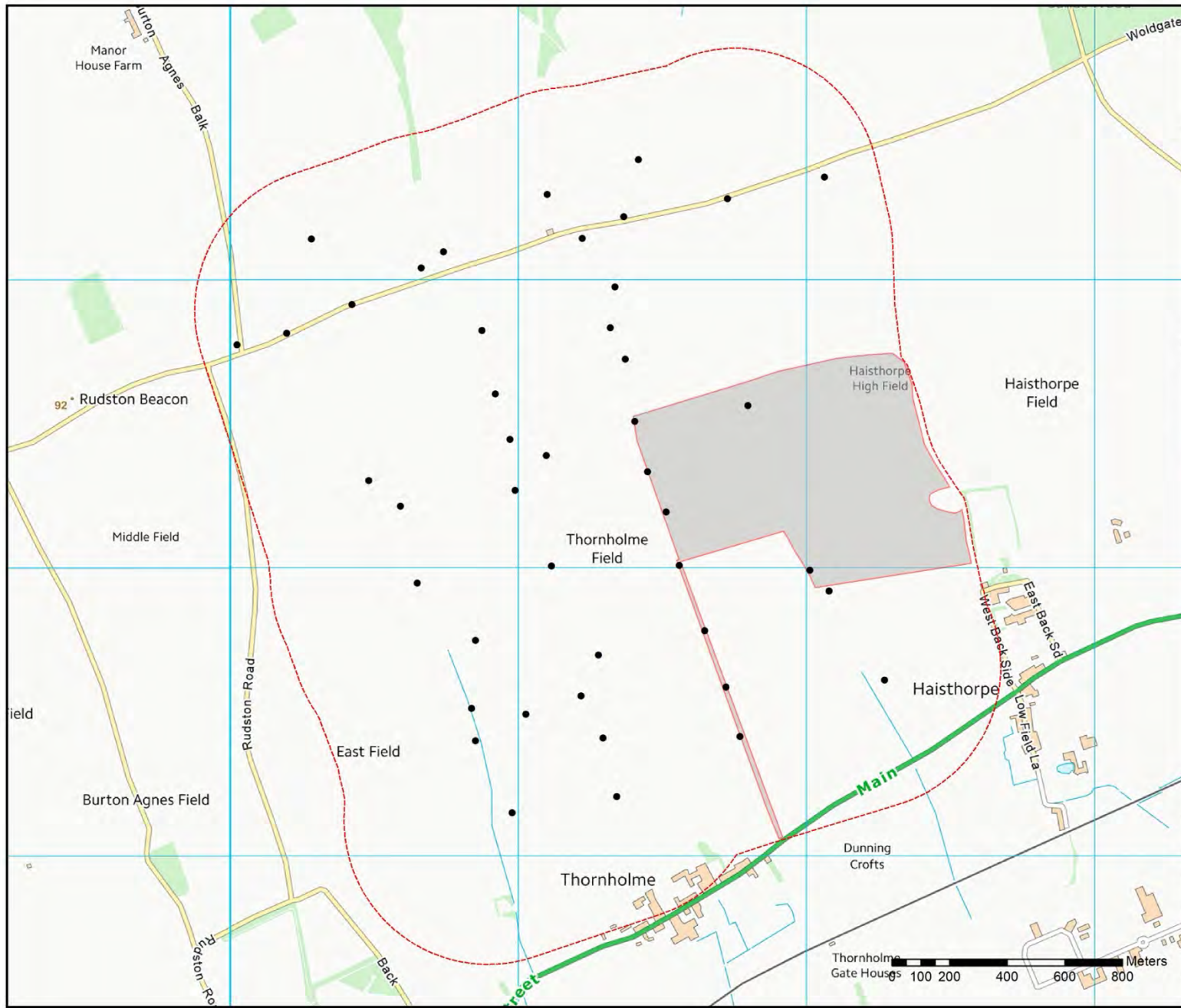
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Three Oaks Renewable Energy Park: Breeding Bird Surveys 2020

FIGURE 7
Distribution of Breeding Yellowhammer

- KEY:**
- Approx. breeding locations
 - █ Indicative Site Boundary & Access
 - ▭ Breeding Bird Survey Area



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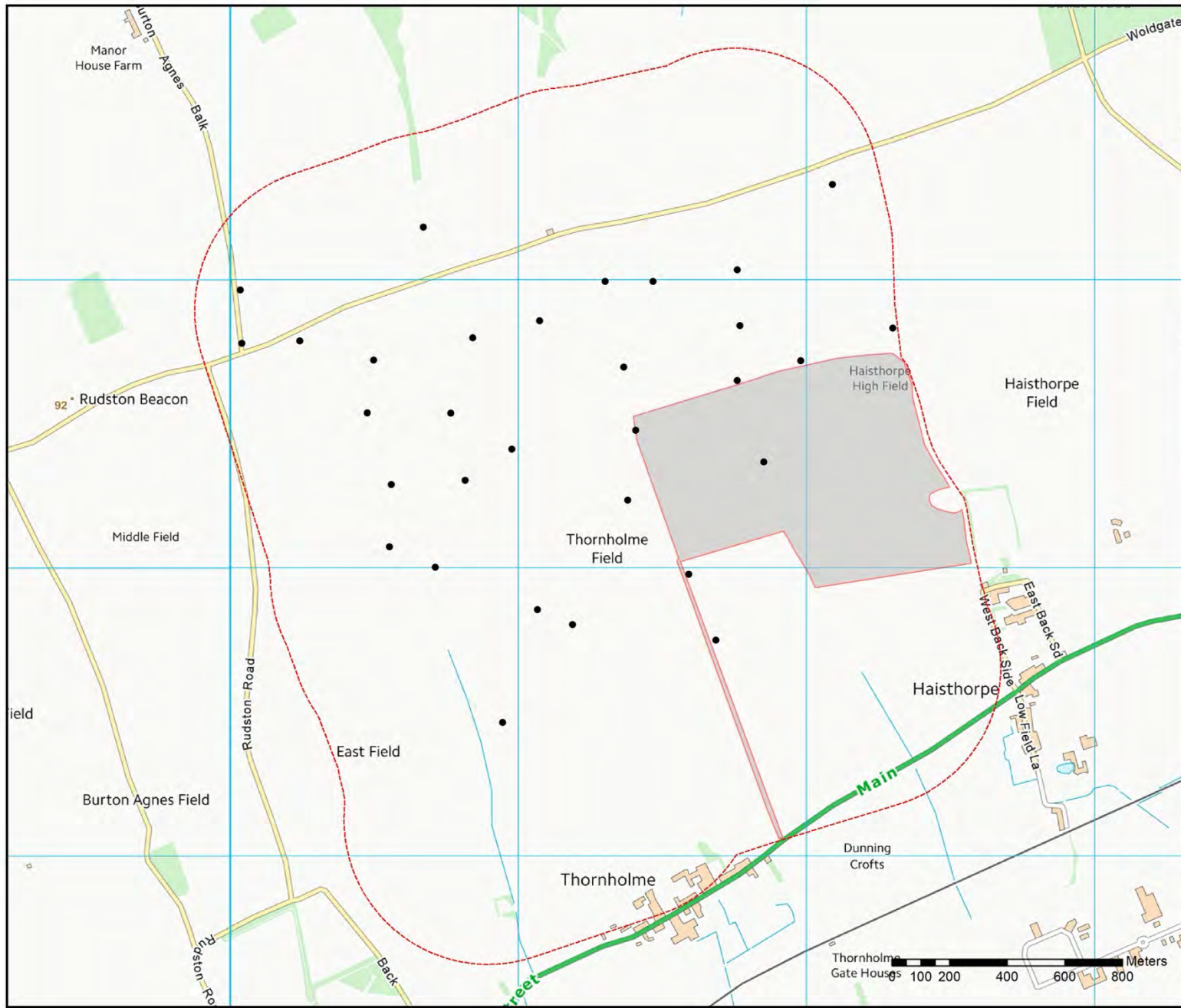
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Three Oaks Renewable Energy Park: Breeding Bird Surveys 2020

FIGURE 8
Distribution of Breeding Corn Bunting

- KEY:**
- Approx. breeding locations
 - Indicative Site Boundary & Access
 - ▭ Breeding Bird Survey Area



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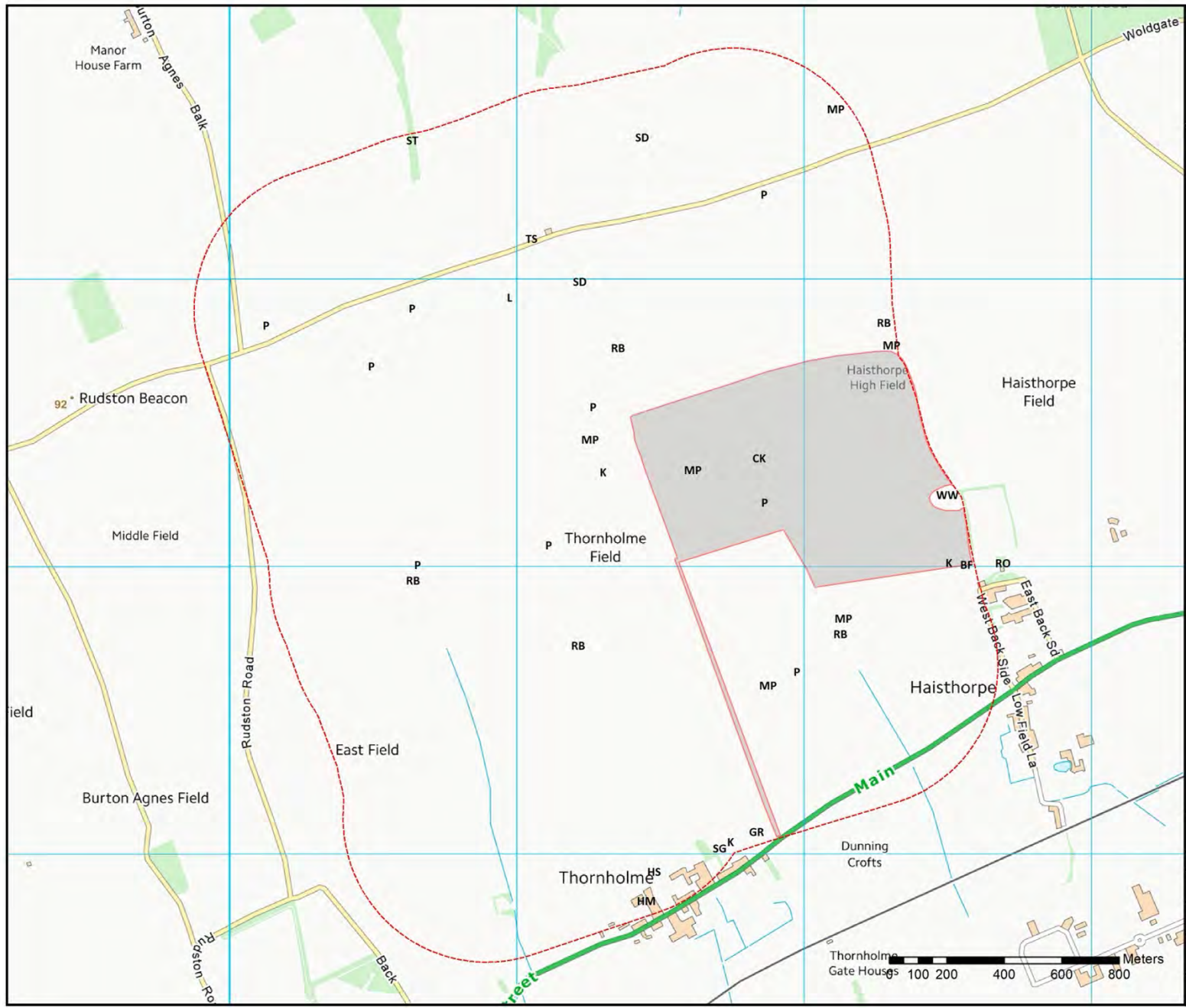
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Three Oaks Renewable Energy Park: Breeding Bird Surveys 2020

FIGURE 9
Distribution of Other Breeding Species



- KEY:**
- Indicative Site Boundary & Access
 - Breeding Bird Survey Area
- Approx. breeding locations:
- P - Grey partridge
 - K - Kestrel
 - L - Lapwing
 - SD - Stock Dove
 - CK - Cuckoo
 - HM - House Martin
 - MP - Meadow Pipit
 - ST - Song Thrush
 - WW - Willow Warbler
 - RO - Rook (20 pairs)
 - SG - Starling
 - HS - House Sparrow
 - TS - Tree Sparrow
 - GR - Greenfinch
 - BF - Bullfinch
 - RB - Reed Bunting



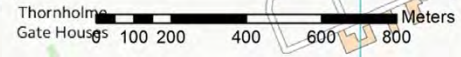
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BREEDING 2020**

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APPENDIX 1. VANTAGE POINT SURVEY DATES AND WEATHER CONDITIONS

Date	Start time	Finish time	Observation Time (hh:mm)	Weather
15/04/2020	14:05	17:05	03:00	cloud 0, wind WSW 3, 15C, vis very good
23/04/2020	16:40	19:40	03:00	cloud 7/8, wind NNE 3, 12C, vis very good
08/05/2020	05:10	08:10	03:00	cloud 7/8, wind W 1, 10C, vis very good
21/05/2020	18:20	21:20	03:00	cloud 1/8, wind W 2, 22C, vis very good
04/06/2020	10:45	13:45	03:00	cloud 8/8, wind NNW 3, 10C, vis very good, showers
18/06/2020	13:00	16:00	03:00	cloud 8/8, wind NNE 3, 12C, showers, vis good
05/07/2020	08:20	11:20	03:00	cloud 2/8, wind WSW 4, 16C, vis excellent
22/07/2020	16:00	19:00	03:00	cloud 8/8, wind SW 2, 17, vis excellent
18/08/2020	08:30	11:30	03:00	cloud 7/8, wind SSW 1, 17C, vis good, fog clearing
18/08/2020	12:00	15:00	03:00	cloud 7/8, wind SSW 3, 18C, vis very good, squall 12:20 - 12:30
03/09/2020	15:00	18:00	03:00	cloud 6/8, wind WSW 3, 21C, vis very good
17/09/2020	11:20	14:20	03:00	cloud 2/8, wind ESE 3, 16C, vis very good

APPENDIX 2. VANTAGE POINT SURVEY KEY SPECIES DATA

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
15/04/2020	14:50	HG	6	W	115		300	
15/04/2020	15:21	HG	60	ESE	40	flushed	130	landed
15/04/2020	15:32	HG	3	ESE	65		170	
15/04/2020	15:52	HG	6	ENE	55		200	
15/04/2020	15:55	K	1	NNW	14	hunt	170	male
15/04/2020	16:07	HG	50	ENE	40	flushed	160	
15/04/2020	16:39	HG	1	ESE	50		150	
15/04/2020	16:50	HG	8	E	50		190	
15/04/2020	16:58	HG	14	SSW	15	feed	90	landed
15/04/2020	17:00	HG	2	WNW	30	feed	100	landed
23/04/2020	16:42	HG	4	ENE	45		100	
23/04/2020	16:46	HG	1	ENE	45		140	
23/04/2020	16:54	HG	2	ENE	45		130	
23/04/2020	16:55	HG	1	E	35		150	
23/04/2020	16:57	HG	3	ENE	60		110	
23/04/2020	17:02	HG	4	ENE	60		110	
23/04/2020	17:03	HG	1	NNE	30		190	
23/04/2020	17:10	HG	2	ENE	45		130	
23/04/2020	17:17	HG	7	ESE	70		200	
23/04/2020	17:25	HG	7	ENE	65		200	
23/04/2020	17:35	HG	3	E	45		180	
23/04/2020	17:02	HG	6	ENE	60		220	
23/04/2020	18:05	HG	3	ESE	55		190	
23/04/2020	18:08	HG	1	ESE	50		220	
23/04/2020	18:13	HG	3	ENE	60		190	
23/04/2020	18:19	K	1	WSW	5	hunt	40	female, landed on pole
23/04/2020	18:22	HG	2	E	80		180	
23/04/2020	18:25	HG	4	E	35		150	
23/04/2020	18:26	HG	2	ENE	90		220	

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
23/04/2020	18:31	ML	1	ESE	41	hunt	80	female, chasing skylark, dropped out of view
23/04/2020	18:36	HG	17	ENE	80		200	
23/04/2020	18:36	LB	1	ENE	80		200	
23/04/2020	18:42	HG	8	E	75		160	
23/04/2020	18:45	HG	8	ESE	80		180	
23/04/2020	18:46	HG	1	ENE	30		90	
23/04/2020	18:57	HG	19	ESE	55	roost	170	
23/04/2020	19:09	HG	6	ENE	60	roost	100	
23/04/2020	19:24	HG	15	ESE	75	roost	180	
23/04/2020	19:29	HG	1	ESE	30	roost	110	
23/04/2020	19:30	HG	36	E	70	roost	200	
23/04/2020	19:33	LB	1	WNW	30		120	
23/04/2020	19:36	HG	24	E	75	roost	190	
08/05/2020	05:12	HG	5	WSW	60	roost	160	
08/05/2020	05:16	HG	2	WSW	80	roost	150	
08/05/2020	05:20	HG	8	SW	20	roost	50	landed
08/05/2020	05:21	LB	3	SSW	55	roost	220	
08/05/2020	05:24	HG	12	SW	15	roost	50	landed
08/05/2020	05:30	HG	3	NNE	30	roost	120	landed
08/05/2020	05:32	HG	2	WNW	25	roost	100	landed
08/05/2020	05:35	HG	2	WSW	50	roost	180	
08/05/2020	05:40	HG	2	ENE	70		140	
08/05/2020	05:42	MR	1	SSW	35	migrating	290	female
08/05/2020	05:45	HG	2	WSW	80	roost	160	
08/05/2020	05:52	HG	2	ESE	45		90	
08/05/2020	06:02	HG	3	WSW	20	feed	120	
08/05/2020	06:04	HG	2	ESE	38		90	
08/05/2020	06:06	HG	2	WNW	30	roost	100	landed
08/05/2020	06:08	HG	4	WNW	45	roost	190	
08/05/2020	06:08	LB	3	WNW	45	roost	190	
08/05/2020	06:15	HG	2	WNW	70	roost	180	
08/05/2020	06:20	HG	1	ENE	70		150	
08/05/2020	06:22	HG	2	WNW	60	roost	90	landed
08/05/2020	06:25	HG	3	ESE	30		90	
08/05/2020	06:27	HG	4	ENE	100		200	
08/05/2020	06:30	HG	2	WSW	30	feed	130	
08/05/2020	06:30	LB	2	WSW	30	feed	130	
08/05/2020	06:32	HG	3	ESE	35		90	
08/05/2020	06:38	HG	3	WSW	25	feed	120	
08/05/2020	06:44	HG	3	WSW	80	roost	150	
08/05/2020	06:48	HG	2	ENE	30		160	
08/05/2020	06:50	HG	4	SW	25	feed	120	landed
08/05/2020	06:56	HG	2	SW	20	feed	110	landed
08/05/2020	06:58	HG	2	NNW	35	feed	130	landed
08/05/2020	07:01	HG	2	ESE	40		90	
08/05/2020	07:05	HG	12	SW	25	flushed	110	landed
08/05/2020	07:05	HG	13	WSW	25	flushed	60	
08/05/2020	07:15	HG	2	ESE	33		90	
08/05/2020	07:17	L	1	S	8	feed	20	landed
08/05/2020	07:20	HG	10	WSW	10	feed	30	
08/05/2020	07:27	HG	2	NW	50	feed	150	
08/05/2020	07:29	HG	5	WNW	35	feed	110	landed
08/05/2020	07:37	HG	1	NW	45	feed	150	
08/05/2020	07:37	LB	1	NW	45	feed	150	
08/05/2020	07:43	HG	1	NNW	35	feed	120	landed
08/05/2020	07:47	HG	2	WNW	40	feed	120	landed

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
08/05/2020	07:50	HG	2	NNW	30	feed	120	landed
08/05/2020	07:52	HG	2	NNE	25	feed	140	landed
08/05/2020	08:02	HG	2	NNE	30	feed	150	landed
08/05/2020	08:04	HG	6	SW	20	feed	45	landed
21/05/2020	18:32	LB	1	NE	30		160	
21/05/2020	18:40	HG	2	ESE	60		170	
21/05/2020	18:53	HG	1	ENE	80		150	
21/05/2020	19:06	HG	1	ESE	60		150	
21/05/2020	19:10	HG	3	NNW	40		130	
21/05/2020	19:24	HG	2	WSW	80		200	
21/05/2020	19:44	HG	7	ENE	80		130	
21/05/2020	19:50	HG	3	ESE	60	roost	150	
21/05/2020	19:50	LB	1	ESE	60	roost	150	
21/05/2020	19:50	HG	2	ENE	40	roost	140	
21/05/2020	20:02	BY	2	WNW	60		200	
21/05/2020	20:10	K	1	ENE	23	hunt	1080	male
04/06/2020	10:57	HG	1	NNW	40	feed	150	
04/06/2020	11:07	LB	1	WNW	50	feed	200	
04/06/2020	11:15	K	1	WNW	25	hunt	30	male
04/06/2020	13:07	K	1	N	18	hunt	200	male
04/06/2020	13:15	HG	2	NNW	80	feed	140	
04/06/2020	13:17	K	1	SSW	105	soar	280	
04/06/2020	13:33	HG	10	S	115	soar	320	
18/06/2020	13:08	LB	1	ENE	20		150	
18/06/2020	13:34	LB	1	SSE	35		140	
18/06/2020	13:41	LB	1	NE	35		160	
18/06/2020	14:07	LB	1	ESE	45		150	
18/06/2020	15:27	LB	1	ENE	30		110	
18/06/2020	15:57	HG	1	SSW	35		160	
05/07/2020	08:24	HG	1	WSW	25		170	
05/07/2020	08:45	HG	7	ENE	33		130	
05/07/2020	08:50	LB	1	ENE	23		140	
05/07/2020	09:16	HG	2	ESE	38		120	
05/07/2020	09:28	HG	3	ESE	35		120	
05/07/2020	10:02	LB	2	ESE	60		160	
05/07/2020	10:12	HG	2	ESE	30		130	
05/07/2020	10:18	HG	1	ESE	28		140	
05/07/2020	10:27	HG	1	ESE	90		110	
05/07/2020	10:29	HG	4	WSW	20		180	
05/07/2020	10:45	HG	2	WSW	15		170	
22/07/2020	16:06	HG	2	SSE	45		200	
22/07/2020	16:22	LB	1	ESE	35		220	
22/07/2020	16:50	HG	1	WSW	30		180	
22/07/2020	16:58	HG	1	ENE	50		200	
22/07/2020	17:27	HG	1	WSW	35		190	
22/07/2020	17:27	LB	2	WSW	35		190	
22/07/2020	17:30	HG	1	SE	33		190	
22/07/2020	17:33	MR	2	SSW	4	migrating	90	juvs, lost to view behind hedges
22/07/2020	17:43	LB	1	SW	23		220	
22/07/2020	17:50	LB	2	NNE	40		110	
22/07/2020	17:57	HG	1	ENE	70		180	
22/07/2020	18:05	LB	1	ESE	40		130	
22/07/2020	18:44	LB	1	WSW	40		200	
22/07/2020	18:56	LB	1	ESE	60		240	
18/08/2020	08:34	HG	87	WNW	70	roost	170	
18/08/2020	08:34	LB	2	WNW	70	roost	170	

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
18/08/2020	08:43	HG	6	WNW	60	roost	140	
18/08/2020	09:00	GP	8	W	120		110	
18/08/2020	09:10	K	1	SSE	13	hunt	200	
18/08/2020	09:13	HG	27	SSW	105		250	
18/08/2020	09:33	HG	15	SSE	65	feed	180	
18/08/2020	09:45	SH	1	N	60	soar	230	female
18/08/2020	09:56	MR	1	ESE	16	hunt	550	female
18/08/2020	09:58	K	1	NNE	17	hunt	50	male
18/08/2020	10:18	HG	2	WSW	90		250	
18/08/2020	10:25	MR	1	SSE	25	hunt	220	female, same as 8
18/08/2020	10:28	SH	2	SSE	55	soar	140	
18/08/2020	10:41	GP	12	SSW	85		160	
18/08/2020	11:03	K	1	SSW	9	hunt	660	female
18/08/2020	11:06	HG	1	E	40		160	
18/08/2020	11:07	SH	1	W	14	hunt	45	juv
18/08/2020	11:23	HG	2	WSW	60		230	
18/08/2020	12:09	MR	2	SE	13	migrating	330	females
18/08/2020	12:15	MR	1	SE	9	migrating	310	juv
18/08/2020	12:36	HG	3	WSW	50		200	
18/08/2020	13:12	ML	1	ENE	3	hunt	50	juv
18/08/2020	13:19	K	1	SW	13	hunt	40	female, landed on wires
18/08/2020	13:33	K	1	NNE	8	hunt	50	female, same as 7
18/08/2020	13:43	GP	15	SW	35	roost	110	landed
18/08/2020	13:44	HG	2	SSW	60	feed	270	
18/08/2020	13:44	GB	1	SSW	60	feed	270	
18/08/2020	13:50	K	1	SW	5	hunt	20	male, landed on wires
18/08/2020	14:01	MR	1	NNW	7	hunt	70	juv
18/08/2020	14:44	HG	2	SE	75	feed	200	
18/08/2020	14:52	HG	38	ESE	55		240	
03/09/2020	15:04	BH	20	WSW	65	feed	150	
03/09/2020	15:04	CM	8	WSW	65	feed	150	
03/09/2020	15:04	HG	60	WSW	65	feed	150	
03/09/2020	15:11	HG	270	ESE	115	flushed	190	
03/09/2020	15:20	HY	1	WSW	40	hunt	110	
03/09/2020	15:35	HG	8	WSW	80	feed	160	
03/09/2020	16:00	K	1	NNW	18	hunt	600	female
03/09/2020	16:06	HG	2	WNW	50		200	
03/09/2020	16:15	HG	2	WSW	65	feed	170	
03/09/2020	16:30	HG	16	NW	45	feed	200	
03/09/2020	16:32	HG	38	WSW	55	feed	180	
03/09/2020	16:41	HG	18	NW	50	feed	200	
03/09/2020	16:46	HG	7	WSW	50	feed	170	
03/09/2020	16:52	HG	10	NW	30	feed	200	
03/09/2020	17:02	SH	1	SW	7	hunt	30	male
03/09/2020	17:04	HG	30	NNW	30	feed	160	
03/09/2020	17:22	HG	3	WSW	60	feed	170	
03/09/2020	17:48	K	1	SSE	10	hunt	140	
17/09/2020	11:27	K	1	NW	9	hunt	40	
17/09/2020	11:45	BH	6	ESE	60	flushed	250	
17/09/2020	11:45	CM	12	ESE	60	flushed	250	
17/09/2020	11:45	HG	59	ESE	60	flushed	250	
17/09/2020	12:00	K	1	ENE	21	hunt	220	
17/09/2020	12:04	SH	1	WSW	3	hunt	50	female
17/09/2020	12:16	HG	1	ESE	65		170	
17/09/2020	12:40	HG	2	WNW	65	feed	110	
17/09/2020	13:06	K	1	SSE	11	hunt	220	
17/09/2020	13:25	SH	1	SE	35	soar	230	female

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
17/09/2020	13:33	K	1	ENE	8	hunt	140	female
17/09/2020	13:42	MR	1	WNW	38	soar	1860	juv
17/09/2020	13:47	HZ	1	W	115	migrating	420	
17/09/2020	13:47	MR	1	W	115	migrating	420	
17/09/2020	13:58	HG	36	SSE	60	flushed	160	
17/09/2020	14:07	K	1	SE	8	hunt	200	female

Appendix 2. Wintering Bird Report

Three Oaks Renewable Energy Park Autumn/ Wintering Bird Survey 2019-20

Report to Ridge Clean Energy

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THREE OAKS RENEWABLE ENERGY PARK AUTUMN/ WINTERING BIRD SURVEYS 2019-20

Introduction

1. This report presents the results of bird survey work at the proposed Three Oaks Renewable Energy Park, Thornholme, East Yorkshire, undertaken outside the breeding season to provide ornithological baseline data for the proposed development. It provides autumn/winter baseline data on the bird populations, activity and flight paths within the vicinity of the proposed development site to inform subsequent ornithological impact assessment.
2. The aim of the autumn/winter field survey work was to obtain data on the importance of the development site and its surrounds for birds outside the breeding season, and on the flight lines of key target species.
3. The surveys were designed to take into account Natural England [NE] (Drewitt 2010, and NE standing advice¹) and Scottish Natural Heritage (2017) guidance on bird surveys for wind farms. The surveys were undertaken by Tom Lowe, a highly experienced bird surveyor.
4. A previous application was submitted for a wind farm at this site in 2011, though was unsuccessful. The baseline surveys from 2010-11 for that application have been included in this report for comparison with the 2019-20 data.

Study Area

5. The site is located approximately 1km north of Thornholme village and 5km west-south-west from Bridlington in East Yorkshire. The wintering bird survey area was chosen to include all areas within the potential zone of ornithological influence of the renewable energy park and a buffer around that to be contextual information on the area's wintering birds. The survey area covered a total area of 11.9km² (see Figure 1). It is predominantly open arable farmland and lies within the 'Yorkshire Wolds' NE Natural Area.

Autumn/Wintering Bird Survey Methods

6. The winter surveys included a field survey based on a simple 'look-see' method, counting the bird numbers within a pre-defined survey area (Gilbert *et al.* 1998) and a vantage point survey, monitoring bird flight activity to quantify movement rates across the survey area, and included daytime movements and dawn/dusk roost flights.
7. **Field counts:** this survey work comprised regular counts of the birds within the wintering bird survey area. Twelve of these surveys were undertaken at approximately fortnightly intervals between October 2019 and March 2020. The

¹ <https://www.gov.uk/guidance/wild-birds-surveys-and-monitoring-for-onshore-wind-farms>

counts were carried out as instantaneous counts, recording a snapshot of the birds present in each field at the time it was surveyed. 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 were covered in each part of the survey area. The following species were recorded:

- All ducks, geese, swans, cormorants, herons, coot and grebes;
 - All waders (including lapwing and golden plover);
 - All birds of prey and owls;
 - Large flocks (>100 birds) of other species (except woodpigeon and rook);
 - Any other notable species.
8. As well as counting each species, the behaviour of each flock was also recorded, e.g. feeding/roosting. Birds in flight over-flying the field during the snapshot were also recorded, together with an estimate their height and direction.
 9. **Habitat/crop mapping:** mapping of the habitats and crop types available in the survey area was carried out during the first visit and then again at approximately 2-month intervals through the season, so that habitat availability could be determined and any changes during the study period taken into account.
 10. **Weather:** weather conditions during all observations were recorded, and visits were made to cover a representative range of visibilities, wind speeds and directions (though avoiding extreme conditions where visibility is severely limited (i.e. fog, continuous heavy rain)).
 11. **Vantage point surveys:** VP surveys were carried out to quantify the bird numbers that overfly the survey area. All flight lines of target species were mapped, and the flight height of each flock recorded. Six hours of surveys were undertaken per month between October 2019 and March 2020 from each vantage point (36 hours in total). A single vantage point was sufficient to cover the current proposed development. The computer-generated viewshed from that VP is shown in Figure 1.
 12. The specific aim of the vantage point (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.
 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 recorded. To estimate flight height as accurately as possible available reference structures were used. Heights were estimated as accurately as possible, 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. Survey dates and conditions are given in Appendix 1, and the key species data in Appendix 2.

- Night surveys were not considered necessary in 2019-20, as previous surveys in 2010-11 had shown that generally bird activity at night was considerably less than observed during the day, and no important nocturnal bird activity was recorded (Percival 2011).

Autumn/Wintering Bird Surveys 2019-20: Results

Autumn/winter field count survey results

- The bird populations found within the survey area during each of the fortnightly field count surveys are summarised in Table 1. The Table shows the bird numbers recorded during each survey, and the overall mean and peak counts. Table 2 gives the mean and peak counts recorded in 2019-20 and in the previous surveys in 2010-11.

Table 1. Autumn/winter bird populations in the Three Oaks survey area during October 2019 - March 2020.

Species	21/10/19	04/11/19	14/11/19	28/11/19	12/12/19	29/12/19	15/01/20	29/01/20	12/02/20	27/02/20	11/03/20	25/03/20	Mean 2019-20	Peak 2019-20
Pink-footed Goose	0	0	0	0	0	0	5	0	0	0	33	0	3.2	33
Grey Heron	0	0	0	1	0	0	0	0	0	0	0	0	0.1	1
Sparrowhawk	0	0	2	1	1	0	0	0	0	0	0	0	0.3	2
Red Kite	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1
Buzzard	2	5	1	0	2	3	2	7	2	1	2	4	2.6	7
Lapwing	0	0	0	0	0	0	0	0	0	0	3	1	0.3	3
Golden Plover	0	16	110	0	0	0	0	0	73	0	0	0	16.6	110
Snipe	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1
Black-headed Gull	561	27	66	4	56	55	48	0	9	100	7	64	83.1	561
Mediterranean Gull	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1
Common Gull	41	11	85	33	65	5	6	1	16	119	101	119	50.2	119
Great Black-backed Gull	1	0	0	0	0	0	1	0	0	0	0	1	0.3	1
Herring Gull	20	582	123	67	8	2	38	13	35	0	28	14	77.5	582
Lesser Black-backed Gull	0	0	0	0	0	0	0	0	0	0	0	3	0.3	3
Kestrel	2	2	4	1	3	2	1	2	2	3	3	5	2.5	5

Table 2. Autumn/winter bird populations in the Three Oaks survey area during 2010-11 and 2019-20 (mean and peak counts).

Species	Mean Count		Peak Count	
	2010-11	2019-20	2010-11	2019-20
Greylag Goose	4.1	0	26	0
Pink-footed Goose	0	3.2	0	33
Mallard	1.4	0	12	0
Grey Heron	0.2	0.1	2	1
Sparrowhawk	0.1	0.3	1	2
Red Kite	0	0.1	0	1
Buzzard	1.1	2.6	3	7
Golden Plover	99.9	16.6	797	110
Lapwing	120.5	0.3	747	3
Snipe	0	0.1	0	1
Woodcock	0.1	0	1	0
Black-headed Gull	138.9	83.1	531	561
Mediterranean Gull	0.5	0.1	3	1
Common Gull	112.1	50.2	480	119
Great Black-backed Gull	1.1	0.3	3	1
Herring Gull	33.1	77.5	156	582
Lesser Black-backed Gull	1.6	0.3	9	3
Barn Owl	0.1	0	1	0
Tawny Owl	0.1	0	1	0
Kestrel	1.4	2.5	4	5

Vantage Point Survey Results

- The rates of bird flight movement observed across the survey area during the vantage point surveys from the single VP are summarised in Table 3. This gives the monthly mean flight rates observed, and the total number of flights recorded during the survey period.

Table 3. Bird flight rates recorded over the Three Oaks wintering bird survey area during October 2019 - March 2020 autumn/winter vantage point surveys. N = 36 hours total observation (6 hours/month).

Species	Flight rate (birds/hour)						Total number of flights
	Oct	Nov	Dec	Jan	Feb	Mar	
Greylag Goose	8.5	0	0	0	0.7	0.3	57
Pink-footed Goose	0	0.7	0	0	0	0	4
Cormorant	0	0	0	0	0.2	0	1
Sparrowhawk	0	0.3	0	0.2	0.2	0	4
Buzzard	0.3	1.2	0.8	1.5	0.8	2.5	43
Lapwing	25.0	0	3.7	0	0	0	172
Golden Plover	3.3	24.3	35.8	0	5.7	0	415
Black-headed Gull	154.3	4.8	3.3	4.3	3.5	2.3	1036
Common Gull	46.3	20.7	0	6.8	19.2	66.3	956
Great Black-backed Gull	0	0.2	0	0.3	0	0.2	4
Glaucous Gull	0	0	0	0	0.2	0	1
Herring Gull	278.0	199.0	34.7	17.3	149.7	65.0	4462
Lesser Black-backed Gull	0	0	0	0	0	0.2	1
Barn Owl	0	0	0	0	0.3	0	2
Kestrel	0	0.8	0.8	1.8	0.2	0.8	27
Merlin	0	0.2	0.2	0	0	0	2
Peregrine	0.2	0	0.2	0.2	0	0	3

18. Table 4 shows a comparison of the flight rates recorded in 2019-20 with those in the previous autumn/winter surveys in 2010-11. The key species seen over the two winters were similar, with the more numerous species including lapwing, golden plover, black-headed gull, common gull and herring gull. There were, though, some difference between the winters, with fewer lapwing, golden plover, black-headed gull and common gull recorded in 2019-20, but more herring gulls in that winter.

Table 4. Comparison of key species flight rates (birds/hour) recorded over the Three Oaks wintering bird survey area during the 2010-11 and 2019-20 vantage point surveys.

Species	Mean flight rate (birds/hour)		Total flights observed	
	2010-11	2019-20	2010-11	2019-20
Greylag Goose	5.0	1.6	209	57
Pink-footed Goose	0.02	0.1	1	4
Mallard	0.8	0	32	0
Cormorant	0.1	0.03	3	1
Grey Heron	0.02	0	1	0
Hen Harrier	0.02	0	1	0
Sparrowhawk	0.1	0.1	4	4
Buzzard	0.5	1.2	23	43
Lapwing	31.9	4.8	1340	172

Species	Mean flight rate (birds/hour)		Total flights observed	
	2010-11	2019-20	2010-11	2019-20
Golden Plover	51.9	11.5	2179	415
Curlew	0.1	0	3	0
Black-headed Gull	79.8	28.8	3351	1036
Common Gull	58	26.6	2435	956
Great Black-backed Gull	0.7	0.1	28	4
Herring Gull	57.6	123.9	2418	4462
Lesser Black-backed Gull	0.4	0.03	16	1
Barn Owl	0	0.1	0	2
Short-eared Owl	0.02	0	1	0
Kestrel	1.4	0.8	60	27
Merlin	0	0.1	0	2
Peregrine	0.05	0.1	2	3

Conservation Evaluation of Wintering Bird Populations

19. The conservation value of the non-breeding bird populations was determined using the criteria specified in Table 5 (from Percival 2007). This includes the criteria adopted by Natural England 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.* 2020). 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 (Frost *et al.* 2021 and Brides *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 and NERC Act Section 41 priority species were all considered in the evaluation process.

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

Sensitivity	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).

Sensitivity	Definition
MEDIUM	Regionally important population of a species, either because of population size or distributional context. NERC Act Section 41 priority species (if not covered above), red-listed species of conservation concern.
LOW	Any other species of conservation interest, e.g. species listed on the Birds of Conservation Concern not covered above. Local BAP species (if not covered above).

20. The conservation value of the wintering bird populations observed in the Three Oaks survey area during the wintering bird surveys has been summarised in Table 6 below. This included eight high sensitivity species (hen harrier, red kite, golden plover, Mediterranean gull, barn owl, short-eared owl, merlin and peregrine) that are EU Birds Directive Annex 1/Wildlife and Countryside Act Schedule 1 species, four medium sensitivity species (UK BAP priority/red listed species of conservation concern; lapwing, woodcock, curlew, and herring gull), and eleven low sensitivity species.

Table 6. Conservation evaluation of the autumn/winter non-breeding bird populations in the Three Oaks survey area.

Species	Mean peak count (2010-11 & 2019-20)	>1% regional population	EU Birds Dir Ann 1	W and C Act Sch 1	Red [R]/ Amber [A] List	UK BAP priority sp	Value
Pink-footed Goose	17				A		Low
Greylag Goose	13				A		Low
Mallard	6				A		Low
Cormorant	1						Nil
Grey Heron	2						Nil
Sparrowhawk	2				A		Low
Hen Harrier	1	✓	✓	✓	R		High
Red Kite	1	✓	✓	✓			High
Buzzard	5						Nil
Golden Plover	454	✓	✓				High
Lapwing	375	✓			R	✓	Medium
Snipe	1				A		Low
Woodcock	1				R		Medium
Curlew	1				R	✓	Medium
Black-headed Gull	546				A		Low
Mediterranean Gull	2		✓	✓	A		High
Common Gull	300				A		Low
Great Black-backed Gull	2				A		Low
Herring Gull	369	✓			R	✓	Medium
Lesser Black-backed Gull	6				A		Low
Barn Owl	1			✓			High
Short-eared Owl	1	✓	✓		A		High
Tawny Owl	1				A		Low
Kestrel	5				A		Low
Merlin	1	✓	✓	✓	R		High
Peregrine	1	✓	✓	✓			High

21. The key autumn/wintering birds recorded were as follows:
- **Pink-footed Geese** - though not recorded in 2010-11, there were several records of this species in 2019-20. Numbers seen were low and only locally important (peak 33, over-flying). Their distribution and flight lines are shown in Figure 2.
 - **Lapwing and Golden Plover** – peak numbers of both of these species were sufficient to be considered as regionally important in 2010-11 but not in 2019-20. No particular concentrations in any part of the study area and no important flight routes were noted. The distribution and flight lines of lapwing are shown in Figure 3 and of golden plover in Figure 4.
 - **Black-headed Gull and Common Gull** - both of these species were seen regularly feeding within and over-flying the site in high numbers, but large regional populations of each mean that the peak numbers recorded during these surveys would be considered of local rather than regional importance (<1% regional population). Flight activity of both species was greater in the southern part of the survey area, to the south of the proposed renewable energy park.
 - **Herring Gull** – this red-listed UK BAP priority species was mainly seen over-flying the study area. Numbers were higher in 2019-20 than in the previous surveys, sufficient to be considered as regionally important. Most records were of birds over-flying the site travelling between feeding areas inland and coastal roosts, though some larger flocks were also seen feeding in the survey area. Their flight lines and distribution during the field counts are shown in Figure 7. Flight activity was highest in the southern part of the survey area, to the south of the proposed renewable energy park.
 - **Mediterranean Gull** – very small numbers of this EU Birds Directive Annex 1 species were recorded infrequently (peak 3 in 2010-11 and 1 in 2019-20). None were recorded during the VP surveys.
 - **Scarce birds of prey and owls** – red kite, barn owl, peregrine and merlin were seen over-flying the study area during the winter period, though all were only seen very infrequently. Additionally, there was a single sighting of a hen harrier and a short-eared owl over-flying in the 2010-11 surveys. The recorded flight lines from 2019-20 are shown in Figure 8. Numbers and frequency of occurrence of all these species were very low.

Conclusions

22. Overall there was no evidence that the survey area (including the proposed development site) was particularly important for any wintering bird populations. No parts of that area held any notable concentrations of birds and no important wintering bird habitats occurred within it.
23. The 2019-20 autumn/wintering bird surveys have found largely similar results to the previous surveys carried out in 2010-11, with few species of conservation importance likely to be affected by the proposed renewable energy park.

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Three Oaks Renewable Energy Park: Winter Bird Surveys 2019-20

FIGURE 1
Bird Survey Area

KEY:

- VP location
- ▭ Indicative Site Boundary & Access
- ▭ Viewshed (20m above ground to 2km)
- ▭ Survey Area (site plus 1km buffer)



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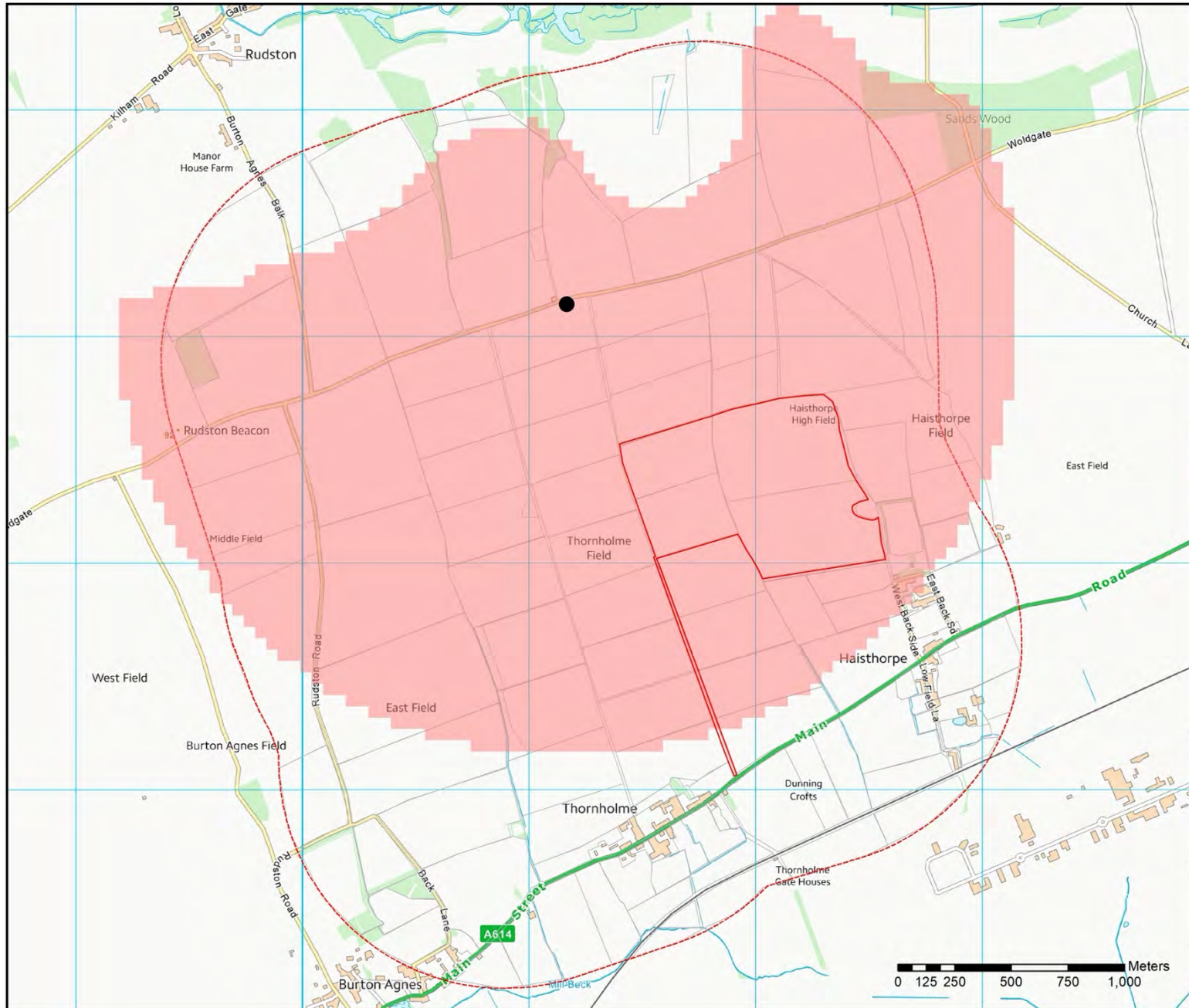
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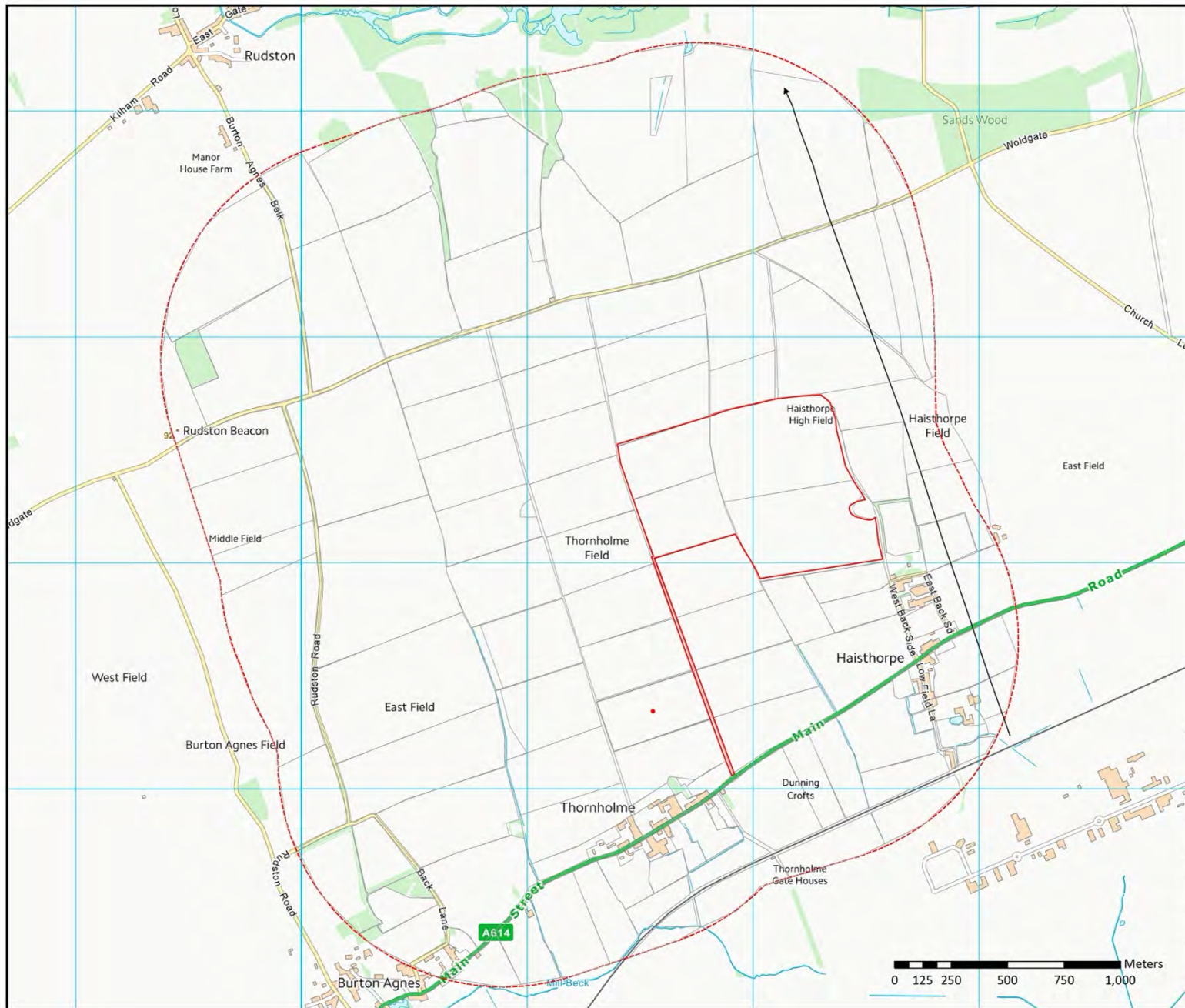
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BIRD SURVEYS
WINTER 2019-20

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Three Oaks Renewable Energy Park: Winter Bird Surveys 2019-20

FIGURE 2
Pink-footed Goose:
field peak counts
and flight lines

- KEY:**
- Site Boundary & Access
 - Survey Area
 - Field peak counts:**
 - 5
 - Flight lines



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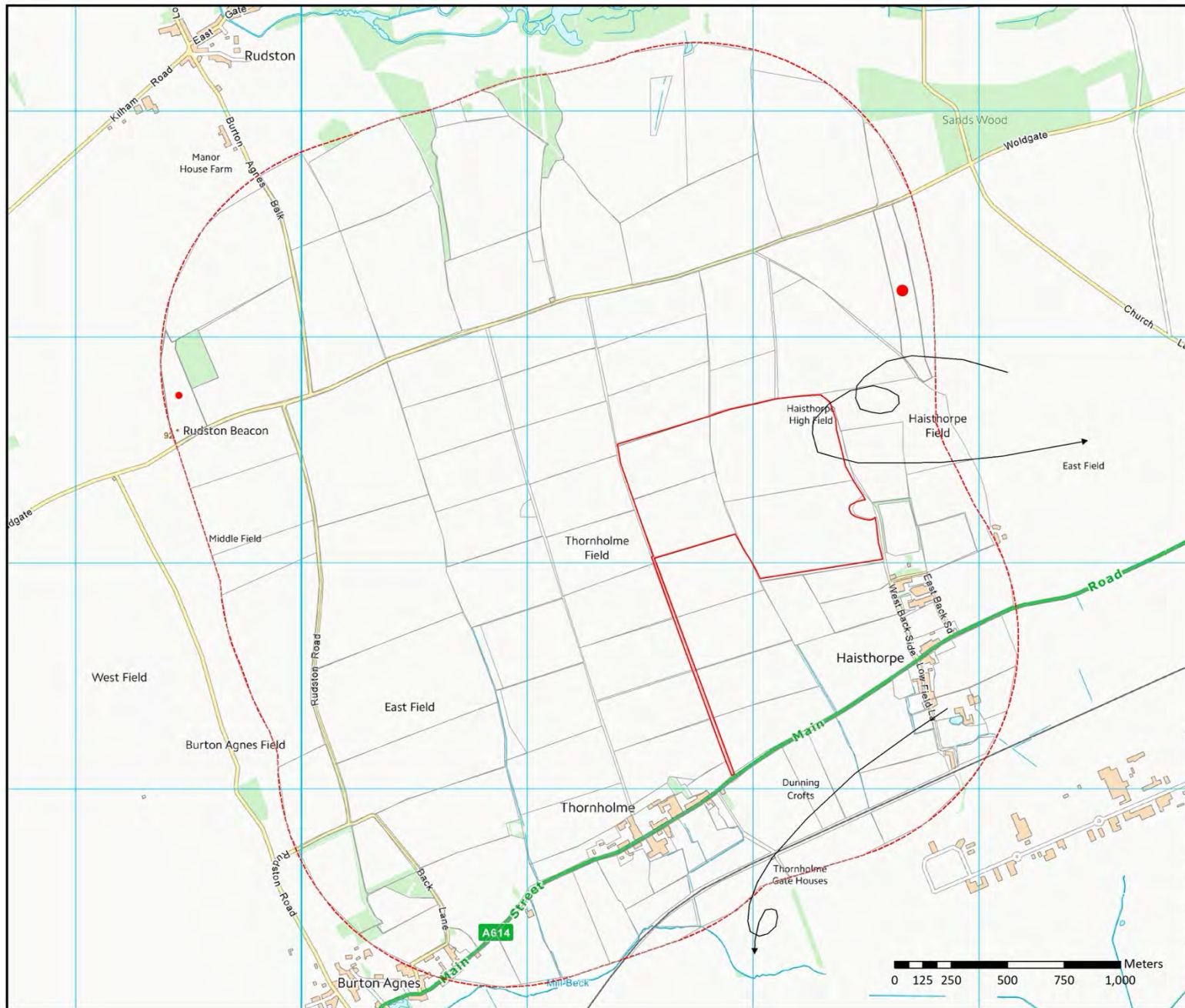
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BIRD SURVEYS
WINTER 2019-20

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Three Oaks Renewable Energy Park: Winter Bird Surveys 2019-20

FIGURE 3

**Lapwing:
field peak counts
and flight lines**

- KEY:**
- Site Boundary & Access
 - Survey Area
 - Field peak counts:**
 - 2
 - Flight lines



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LAYOUT DATE: N/A E-LAYOUT NO.: N/A

ISSUANCE NUMBER: n/a

SCALE - 1:16,000 @ A3

**BIRD SURVEYS
WINTER 2019-20**

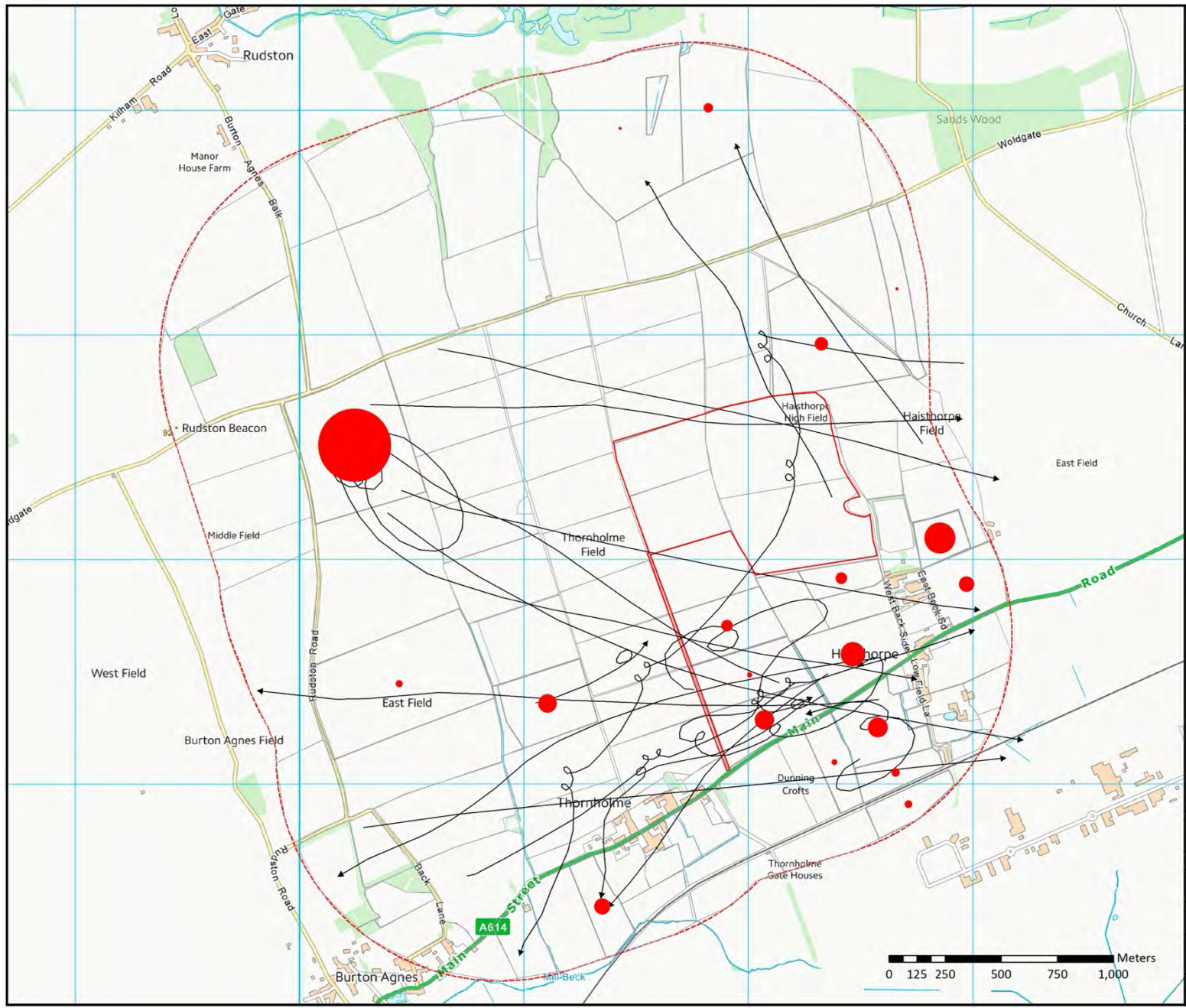
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Three Oaks Renewable Energy Park: Winter Bird Surveys 2019-20

FIGURE 5

Black-headed Gull: field peak counts and flight lines



KEY:

- Site Boundary & Access
- Survey Area

Field peak counts:

- 1
- 10
- 100

Flight lines



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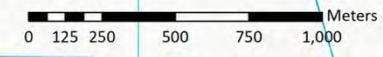
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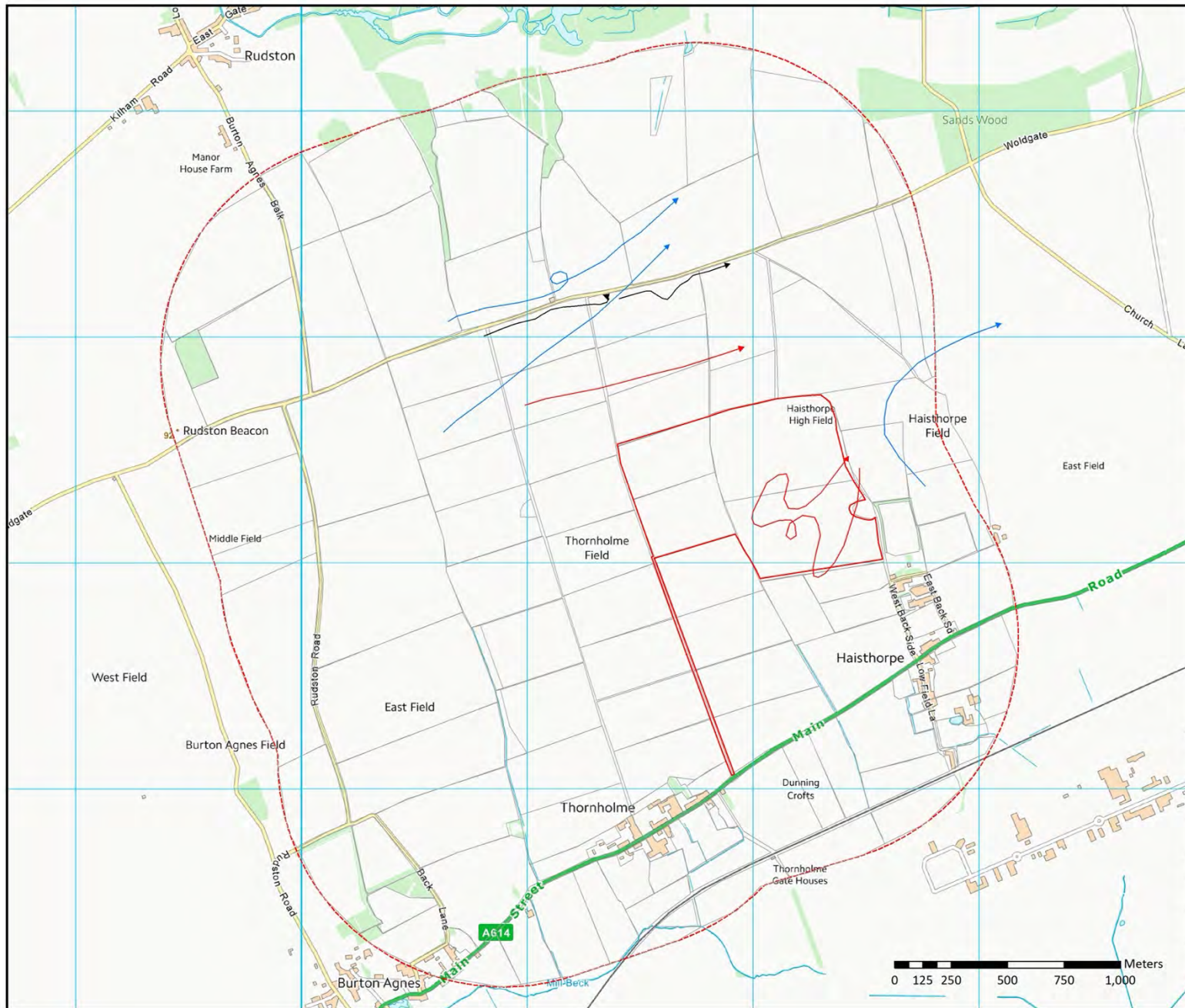
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**BIRD SURVEYS
WINTER 2019-20**

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Three Oaks Renewable Energy Park: Winter Bird Surveys 2019-20

FIGURE 8
Barn Owl, Merlin and Peregrine flight lines

- KEY:**
- Site Boundary & Access
 - Survey Area
- Flight lines:**
- Barn Owl
 - Merlin
 - Peregrine



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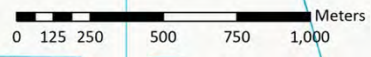
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**BIRD SURVEYS
WINTER 2019-20**

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APPENDIX 1. SURVEY DATES AND WEATHER CONDITIONS

Field Count Surveys

Visit No	Date	Weather
1	21/10/2019	cloud 8/8 - 7/8, wind N 3, 10C, vis excellent
2	04/11/2019	cloud 7/8, wind ENE 1, 10C, vis very good
3	14/11/2019	cloud 8/8, wind NE 4, 7C, vis very good
4	28/11/2019	cloud 8/8, wind NNE 3-4, 9 to 7C, vis good
5	12/12/2019	cloud 8/8, wind S-SSE 2, 5C, vis very good, light rain
6	29/12/2019	cloud 8/8, wind SSW 4, 8C, vis very good
7	15/01/2020	cloud 8/8, wind SW 3, 6C, vis very good
8	29/01/2020	cloud 2/8 - 7/8, wind WSW 3, 7C, vis very good
9	12/02/2020	cloud 1/8 - 4/8, wind WSW 4, 5C, vis very good
10	27/02/2020	cloud 3/8 - 2/8, wind NW 3, 6C, vis very good
11	11/03/2020	cloud 0, wind SW 3-4, 9C, vis very good
12	25/03/2020	cloud 0, wind SSE 2-3, 12C, vis very good

Vantage Points Surveys

Date	Start time	Finish time	Observation Time (hh:mm)	Weather
21/10/2019	15:25	18:25	03:00	cloud 7/8, wind N 3, 10C, vis excellent
04/11/2019	11:30	14:30	03:00	cloud 8/8, wind ESE 1, 9C, vis very good, heavy shower
14/11/2019	07:00	10:00	03:00	cloud 7/8, wind NE 4, 6C, vis very good
28/11/2019	10:10	13:10	03:00	cloud 8/8, wind NNE 3, 9C, vis good, showers
12/12/2019	07:40	10:40	03:00	cloud 6/8, wind S 2, 0C, vis very good
29/12/2019	11:05	14:05	03:00	cloud 8/8, wind SSW 4, 8C, vis good
15/01/2020	09:50	11:20	01:30	cloud 8/8, wind SW 3, 6C, vis very good
15/01/2020	14:00	15:30	01:30	cloud 0, wind WSW 4, 8C, vis very good
29/01/2020	14:05	17:05	03:00	cloud 7/8, wind WSW 3, 7C, vis very good
12/02/2020	07:00	10:00	03:00	cloud 0, wind WSW 4, 3C, vis very good
27/02/2020	15:05	18:05	03:00	cloud 2/8, wind NW 3, 6C, vis very good
11/03/2020	10:00	13:00	03:00	cloud 0, wind SW 4, 9C, vis very good
25/03/2020	16:00	19:00	03:00	cloud 0, wind SSE 3, 12C, vis very good
04/11/2019	11:30	14:30	03:00	cloud 8/8, wind ESE 1, 9C, vis very good, heavy shower
14/11/2019	07:00	10:00	03:00	cloud 7/8, wind NE 4, 6C, vis very good
28/11/2019	10:10	13:10	03:00	cloud 8/8, wind NNE 3, 9C, vis good, showers
12/12/2019	07:40	10:40	03:00	cloud 6/8, wind S 2, 0C, vis very good
29/12/2019	11:05	14:05	03:00	cloud 8/8, wind SSW 4, 8C, vis good
15/01/2020	09:50	11:20	01:30	cloud 8/8, wind SW 3, 6C, vis very good
15/01/2020	14:00	15:30	01:30	cloud 0, wind WSW 4, 8C, vis very good

Date	Start time	Finish time	Observation Time (hh:mm)	Weather
29/01/2020	14:05	17:05	03:00	cloud 7/8, wind WSW 3, 7C, vis very good
12/02/2020	07:00	10:00	03:00	cloud 0, wind WSW 4, 3C, vis very good
27/02/2020	15:05	18:05	03:00	cloud 2/8, wind NW 3, 6C, vis very good
11/03/2020	10:00	13:00	03:00	cloud 0, wind SW 4, 9C, vis very good
25/03/2020	16:00	19:00	03:00	cloud 0, wind SSE 3, 12C, vis very good

APPENDIX 2. VANTAGE POINT SURVEY KEY SPECIES DATA

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
21/10/2019	15:29	HG	1	NNW	30	feed	100	landed
21/10/2019	15:34	PE	1	NW	50	hunt	45	juv
21/10/2019	15:39	BH	15	WNW	40	feed	140	landed
21/10/2019	15:39	HG	4	WNW	40	feed	140	landed
21/10/2019	15:50	HG	2	NNW	25	feed	120	landed
21/10/2019	15:56	CM	4	WNW	45	feed	150	landed
21/10/2019	16:07	BH	350	NNW	40	flushed	250	
21/10/2019	16:07	CM	50	NNW	40	flushed	250	
21/10/2019	16:07	HG	90	NNW	40	flushed	250	
21/10/2019	16:07	BH	250	NNW	40	flushed	180	landed again
21/10/2019	16:07	CM	70	NNW	40	flushed	180	
21/10/2019	16:07	HG	120	NNW	40	flushed	180	
21/10/2019	16:10	L	150	WNW	115	flushed	110	
21/10/2019	16:10	GP	20	WNW	115	flushed	110	
21/10/2019	16:16	HG	4	WNW	40	feed	150	landed
21/10/2019	16:20	HG	7	WNW	40	feed	180	landed
21/10/2019	16:24	HG	11	WNW	40	feed	160	landed
21/10/2019	16:35	BH	60	ESE	60	roost	170	
21/10/2019	16:35	CM	70	ESE	60	roost	170	
21/10/2019	16:35	HG	4	ESE	60	roost	170	
21/10/2019	16:43	HG	8	ESE	40	roost	160	
21/10/2019	16:50	HG	11	ESE	45	roost	160	
21/10/2019	16:52	HG	1	WNW	35	feed	180	
21/10/2019	17:01	BH	40	ESE	40	roost	160	
21/10/2019	17:01	CM	4	ESE	40	roost	160	
21/10/2019	17:01	HG	6	ESE	40	roost	160	
21/10/2019	17:08	BH	25	ESE	50	roost	180	
21/10/2019	17:08	HG	14	ESE	50	roost	180	
21/10/2019	17:13	BH	75	ESE	50	roost	170	
21/10/2019	17:13	CM	35	ESE	50	roost	170	
21/10/2019	17:13	HG	24	ESE	50	roost	170	
21/10/2019	17:16	BH	1	ESE	125	roost	140	
21/10/2019	17:16	CM	15	ESE	125	roost	140	
21/10/2019	17:18	BH	20	ESE	45	roost	170	
21/10/2019	17:18	CM	30	ESE	45	roost	170	
21/10/2019	17:18	HG	70	ESE	45	roost	170	
21/10/2019	17:20	HG	16	ESE	40	roost	160	
21/10/2019	17:21	HG	18	ESE	45	roost	170	
21/10/2019	17:27	HG	41	ESE	40	roost	160	
21/10/2019	17:29	HG	17	ENE	150	roost	150	
21/10/2019	17:33	HG	246	ESE	40	roost	160	
21/10/2019	17:36	HG	170	ESE	100	roost	220	
21/10/2019	17:39	BH	90	ENE	150	roost	150	

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
21/10/2019	17:39	HG	260	ENE	150	roost	150	
21/10/2019	17:41	HG	35	ESE	50	roost	160	
21/10/2019	17:43	HG	58	ENE	120	roost	150	
21/10/2019	17:44	HG	36	ESE	45	roost	150	
21/10/2019	17:45	HG	154	ESE	40	roost	150	
21/10/2019	17:46	HG	17	ESE	90	roost	230	
21/10/2019	17:50	GJ	51	NE	20	roost	110	landed
21/10/2019	17:52	HG	41	ESE	40	roost	160	
21/10/2019	17:54	HG	44	ESE	150	roost	240	
21/10/2019	17:55	HG	62	ESE	45	roost	170	
21/10/2019	18:01	HG	76	ESE	70	roost	140	
04/11/2019	11:36	HG	1	ENE	13	feed	50	landed
04/11/2019	11:41	HG	3	WSW	8	feed	45	landed
04/11/2019	11:45	HG	6	WSW	8	feed	45	landed
04/11/2019	11:52	HG	14	SW	20	feed	55	landed
04/11/2019	12:00	HG	13	SW	35	feed	110	landed
04/11/2019	12:08	HG	21	WSW	10	feed	50	landed
04/11/2019	12:12	HG	6	SW	15	feed	60	landed
04/11/2019	12:18	HG	18	WSW	10	feed	50	landed
04/11/2019	12:20	HG	1	SE	25	feed	110	landed
04/11/2019	12:25	HG	16	WSW	6	feed	40	landed
04/11/2019	12:29	HG	18	WSW	5	feed	40	landed
04/11/2019	12:34	HG	170	ENE	45	flushed	170	landed
04/11/2019	12:34	HG	60	NE	40	flushed	150	landed
04/11/2019	12:45	GP	8	SE	90		190	
04/11/2019	12:49	GP	58	WSW	100		100	
04/11/2019	12:57	HG	26	NNE	10	feed	50	landed
04/11/2019	13:03	HG	23	NNE	10	feed	45	landed
04/11/2019	13:08	HG	21	NNE	10	feed	50	landed
04/11/2019	13:14	HG	16	NNE	10	feed	50	landed
04/11/2019	13:20	HG	20	NNE	8	feed	50	landed
04/11/2019	13:22	HG	115	E	15	flushed	100	landed
04/11/2019	13:28	HG	86	WSW	5	feed	30	landed
04/11/2019	13:33	HG	4	ENE	6	feed	20	landed
04/11/2019	13:40	HG	17	WSW	6	feed	30	landed
04/11/2019	13:43	HG	3	ENE	8	feed	20	landed
04/11/2019	13:47	HG	1	SSE	20	feed	90	landed
04/11/2019	13:55	PG	4	NNW	105	migrating	150	
04/11/2019	13:56	GP	80	SSE	105		140	
04/11/2019	14:03	HG	21	WSW	10	feed	30	landed
04/11/2019	14:10	HG	130	circle	15	flushed	50	landed
04/11/2019	14:14	HG	4	WSW	20	feed	50	landed
04/11/2019	14:16	HG	5	WSW	6	feed	30	landed
04/11/2019	14:20	HG	121	WSW	30	feed	130	landed
04/11/2019	14:25	HG	6	WSW	8	feed	30	landed

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
14/11/2019	07:28	HG	4	SW	90	roost	240	
14/11/2019	07:42	BH	5	NNW	20	roost	150	
14/11/2019	07:42	CM	3	NNW	20	roost	150	
14/11/2019	07:46	BH	1	NNW	18	roost	130	
14/11/2019	07:46	CM	13	NNW	18	roost	130	
14/11/2019	07:46	HG	2	NNW	18	roost	130	
14/11/2019	07:58	BH	1	WNW	55	roost	420	weird sudden change in direction
14/11/2019	07:58	CM	2	WNW	55	roost	420	weird sudden change in direction
14/11/2019	07:58	HG	83	WNW	55	roost	420	weird sudden change in direction
14/11/2019	08:17	HG	7	WSW	35	roost	170	
14/11/2019	08:23	HG	1	N	23	feed	180	
14/11/2019	08:25	HG	1	ENE	18		140	
14/11/2019	08:36	HG	8	WSW	25	feed	160	
14/11/2019	08:44	CM	3	E	4	feed	70	landed
14/11/2019	08:47	CM	13	WSW	10	feed	100	landed
14/11/2019	08:54	CM	18	WSW	8	feed	120	landed
14/11/2019	08:54	HG	43	WSW	8	feed	120	landed
14/11/2019	09:11	HG	16	ENE	4		50	
14/11/2019	09:28	BH	20	NW	25	flushed	120	
14/11/2019	09:28	CM	50	NW	25	flushed	120	
14/11/2019	09:28	HG	40	NW	25	flushed	120	
14/11/2019	09:42	HG	7	ENE	13	feed	170	landed
14/11/2019	09:46	HG	1	SW	65	feed	150	
28/11/2019	10:14	HG	12	W	45	feed	130	
28/11/2019	12:03	ML	1	SSW	30	hunt	130	female, chasing passerine, lost to view
28/11/2019	12:22	BH	2	ENE	3	feed	40	landed
28/11/2019	12:22	CM	22	ENE	3	feed	40	landed
28/11/2019	12:54	HG	3	WNW	25	feed	70	landed
12/12/2019	07:52	PE	1	ENE	38	hunt	60	ad male
12/12/2019	07:58	HG	9	SW	80	roost	140	
12/12/2019	08:15	HG	4	WSW	20	roost	50	landed
12/12/2019	08:23	HG	3	NW	55	roost	130	
12/12/2019	08:30	HG	11	WSW	6	feed	30	landed
12/12/2019	08:34	HG	4	WNW	60	roost	120	
12/12/2019	08:37	HG	2	WNW	50	roost	110	
12/12/2019	08:49	HG	7	WNW	60	roost	130	
12/12/2019	08:58	HG	8	WNW	3	feed	20	landed
12/12/2019	09:00	HG	14	SSW	40	roost	130	landed
12/12/2019	09:04	ML	1	ENE	3	hunt	45	female#
12/12/2019	09:20	HG	2	WSW	15	feed	80	landed
12/12/2019	09:35	HG	11	SSW	13	flushed	90	landed
12/12/2019	09:45	GP	25	SW	90		140	
12/12/2019	09:50	HG	3	SSE	45		280	landed

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
12/12/2019	09:53	HG	57	SSW	30	flushed	100	landed
12/12/2019	10:06	HG	60	SSW	20	flushed	50	
12/12/2019	10:08	GP	190	SE	75	roost	1020	landed
12/12/2019	10:22	L	22	SW	15	roost	90	landed
12/12/2019	10:27	HG	1	SSE	80		160	
29/12/2019	11:38	BH	2	WSW	5	feed	100	landed
29/12/2019	12:07	BH	18	WSW	6	feed	160	landed
29/12/2019	12:25	HG	4	SSE	90		180	
29/12/2019	13:37	HG	5	ENE	75		170	
29/12/2019	13:44	HG	3	SSE	65		230	
15/01/2020	10:00	HG	3	SSW	33	feed	150	
15/01/2020	10:08	HG	1	SW	20	feed	140	
15/01/2020	10:17	HG	4	WSW	15	feed	290	
15/01/2020	10:25	HG	6	SW	8	feed	80	landed
15/01/2020	10:38	HG	6	WSW	15	feed	100	same as 4
15/01/2020	10:47	HG	1	SW	28	feed	150	
15/01/2020	11:04	HG	2	SSE	35	feed	110	landed
15/01/2020	11:07	BH	22	WSW	20	feed	250	landed
15/01/2020	11:12	HG	2	SSW	20	feed	160	
15/01/2020	15:02	PE	1	ENE	20	hunt	80	ad
15/01/2020	15:24	CM	16	SE	65	roost	240	
29/01/2020	14:10	HG	1	ENE	20		90	
29/01/2020	14:18	HG	17	E	75		240	
29/01/2020	14:28	HG	8	ESE	80		150	
29/01/2020	14:38	BH	4	ENE	33		200	
29/01/2020	14:38	CM	24	ENE	33		200	
29/01/2020	15:07	HG	2	WSW	45	feed	160	
29/01/2020	15:24	HG	2	WSW	45	feed	180	
29/01/2020	15:32	HG	7	WSW	48	feed	180	
29/01/2020	15:48	HG	2	WSW	50	feed	160	
29/01/2020	15:52	HG	1	WSW	35	feed	150	
29/01/2020	15:58	HG	7	ENE	90	roost	200	
29/01/2020	16:01	HG	9	ESE	95	roost	250	
29/01/2020	16:12	CM	1	ENE	100	roost	150	
29/01/2020	16:12	HG	22	ENE	100	roost	150	
29/01/2020	16:18	HG	1	WSW	30	feed	170	
12/02/2020	07:06	GJ	4	NNW	18	roost	170	
12/02/2020	07:18	HG	124	WSW	23	roost	160	
12/02/2020	07:18	GZ	1	WSW	23	roost	160	
12/02/2020	07:24	HG	25	WSW	20	roost	150	
12/02/2020	07:25	HG	19	W	15	roost	240	
12/02/2020	07:32	HG	11	WSW	25	roost	170	
12/02/2020	07:32	HG	38	W	13	roost	200	
12/02/2020	07:36	BH	5	W	8	roost	220	
12/02/2020	07:36	CM	3	W	8	roost	220	

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
12/02/2020	07:36	HG	53	W	8	roost	220	
12/02/2020	07:38	HG	56	WSW	25	roost	180	
12/02/2020	07:40	BH	5	W	8	roost	200	
12/02/2020	07:40	CM	3	W	8	roost	200	
12/02/2020	07:40	HG	18	W	8	roost	200	
12/02/2020	07:42	HG	52	WSW	25	roost	180	
12/02/2020	07:44	CM	14	W	6	roost	200	
12/02/2020	07:44	HG	8	W	6	roost	200	
12/02/2020	07:49	HG	14	WSW	15	roost	180	
12/02/2020	07:50	CM	11	WSW	8	roost	170	
12/02/2020	07:50	HG	10	WSW	8	roost	170	
12/02/2020	07:54	HG	12	WSW	10	roost	180	
12/02/2020	07:55	BH	2	WSW	8	roost	180	
12/02/2020	07:55	CM	55	WSW	8	roost	180	
12/02/2020	07:55	HG	13	WSW	8	roost	180	
12/02/2020	07:58	CM	3	WSW	23	roost	220	
12/02/2020	07:58	HG	39	WSW	23	roost	220	
12/02/2020	08:01	HG	16	WSW	13	roost	180	
12/02/2020	08:02	BH	2	WSW	6	roost	180	
12/02/2020	08:02	CM	6	WSW	6	roost	180	
12/02/2020	08:02	HG	5	WSW	6	roost	180	
12/02/2020	08:08	HG	6	WSW	11	roost	190	
12/02/2020	08:10	HG	4	WSW	18	roost	220	
12/02/2020	08:17	HG	2	W	20	roost	80	
12/02/2020	08:18	HG	17	WSW	15	roost	200	
12/02/2020	08:25	CM	7	W	6	roost	240	
12/02/2020	08:32	HG	3	WSW	16	roost	120	
12/02/2020	08:37	HG	6	WSW	15	roost	180	
12/02/2020	08:45	HG	3	WSW	15	roost	200	
12/02/2020	09:02	HG	3	NNW	8	feed	140	
12/02/2020	09:06	HG	4	WSW	15	feed	200	
12/02/2020	09:13	GP	34	WSW	21		80	lost to view in dip, may have landed
12/02/2020	09:28	HG	6	WSW	8	feed	160	landed
12/02/2020	09:30	HG	1	SSW	16	feed	120	
12/02/2020	09:37	HG	85	ESE	30	flushed	150	
12/02/2020	09:37	HG	9	ESE	48	flushed	200	
12/02/2020	09:37	HG	2	ESE	48	flushed	180	
12/02/2020	09:46	HG	6	W	20	feed	170	
12/02/2020	09:49	HG	6	W	6	feed	180	
12/02/2020	09:57	CM	5	WSW	5	feed	180	
27/02/2020	15:12	HG	1	NNE	70		240	
27/02/2020	15:18	CM	1	WSW	5	feed	200	
27/02/2020	15:39	BO	1	ENE	1	hunt	70	landed on kill
27/02/2020	15:44	BO	1	ENE	1	hunt	80	same as 3
27/02/2020	16:00	HG	2	ESE	80		300	

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
27/02/2020	16:04	CM	2	NNW	18	feed	110	
27/02/2020	16:09	CM	2	NNW	23	feed	140	
27/02/2020	16:17	CM	3	NNW	25	feed	120	
27/02/2020	16:25	BH	7	SW	15	flushed	110	landed
27/02/2020	16:55	HG	9	ENE	100	roost	180	
27/02/2020	16:59	HG	2	ENE	60	roost	150	
27/02/2020	17:03	HG	1	E	20	roost	120	
27/02/2020	17:08	HG	1	ESE	50	roost	150	
27/02/2020	17:10	HG	46	ENE	90	roost	180	
27/02/2020	17:18	HG	1	ENE	50	roost	110	
27/02/2020	17:20	HG	54	ENE	100	roost	200	
27/02/2020	17:25	HG	4	E	80	roost	120	
27/02/2020	17:31	HG	2	ESE	70	roost	170	
27/02/2020	17:32	HG	4	E	80	roost	120	
27/02/2020	17:35	HG	4	ESE	75	roost	130	
27/02/2020	17:37	HG	85	ENE	70	roost	170	
27/02/2020	17:40	HG	2	ESE	75	roost	150	
27/02/2020	17:50	HG	4	E	80	roost	130	
11/03/2020	10:08	HG	7	SW	30		200	
11/03/2020	10:17	CM	8	WSW	13	feed	220	
11/03/2020	10:27	CM	52	SW	35		230	
11/03/2020	10:27	HG	2	SW	35		230	
11/03/2020	10:35	CM	24	SW	30		240	
11/03/2020	10:35	HG	3	SW	30		240	
11/03/2020	10:44	CM	14	SW	33		240	
11/03/2020	10:44	HG	12	SW	33		240	
11/03/2020	10:52	CM	2	SW	40		220	
11/03/2020	10:52	HG	22	SW	40		220	
11/03/2020	10:54	CM	8	WSW	11	feed	200	
11/03/2020	11:05	CM	4	WSW	8	feed	200	
11/03/2020	11:07	HG	3	SW	35		240	
11/03/2020	11:12	CM	3	SW	35		180	
11/03/2020	11:12	HG	13	SW	35		180	
11/03/2020	11:16	HG	5	SSW	45		250	
11/03/2020	11:27	CM	5	WSW	11	feed	250	
11/03/2020	11:40	CM	6	WSW	11		180	
11/03/2020	11:44	CM	24	WSW	18		200	
11/03/2020	11:44	HG	2	WSW	18		200	
11/03/2020	11:46	HG	5	SW	30		220	
11/03/2020	11:55	HG	17	SW	38		230	
11/03/2020	11:57	CM	6	WSW	11		180	
11/03/2020	12:04	HG	21	SW	18		220	
11/03/2020	12:09	HG	11	WSW	55		110	
11/03/2020	12:11	HG	2	WNW	40		130	
11/03/2020	12:11	HG	9	W	30		220	

Date	Time	Species	Count	Direction of flight	Flight height (m)	Activity	Time observed (sec)	Notes
11/03/2020	12:17	HG	18	WSW	20		200	
11/03/2020	12:23	HG	17	SW	30		200	
11/03/2020	12:27	HG	21	WSW	25		220	
11/03/2020	12:32	HG	3	WSW	65		120	
11/03/2020	12:38	CM	6	WSW	30		200	
11/03/2020	12:38	HG	18	WSW	30		200	
11/03/2020	12:38	LB	1	WSW	30		200	
11/03/2020	12:44	CM	8	WSW	15		180	
11/03/2020	12:50	HG	16	WSW	40		220	
11/03/2020	12:53	HG	2	ESE	35		170	
25/03/2020	16:01	HG	1	WNW	50		120	
25/03/2020	16:05	HG	30	SSW	85		400	
25/03/2020	16:15	CM	3	ESE	65		150	
25/03/2020	16:22	BH	14	E	40		150	
25/03/2020	16:22	CM	182	E	40		150	
25/03/2020	16:22	HG	17	E	40		150	
25/03/2020	16:27	CM	27	ESE	70		160	
25/03/2020	16:27	HG	15	ESE	70		160	
25/03/2020	16:32	CM	5	ESE	75		150	
25/03/2020	16:32	HG	3	ESE	75		150	
25/03/2020	16:34	CM	4	ENE	70		170	
25/03/2020	16:44	CM	5	ENE	60		180	
25/03/2020	16:53	HG	1	E	80		200	
25/03/2020	17:00	HG	2	SE	50		220	
25/03/2020	17:17	CM	2	SW	35	feed	140	landed
25/03/2020	17:24	GJ	2	SSW	45		140	
25/03/2020	17:34	HG	1	NNW	45		240	
25/03/2020	17:37	HG	4	SE	80	roost	170	
25/03/2020	17:38	HG	2	SE	30	feed	100	landed
25/03/2020	17:47	HG	8	SE	85	roost	180	
25/03/2020	18:54	HG	57	ESE	75	roost	150	
25/03/2020	18:03	HG	2	SE	85	roost	180	
25/03/2020	18:07	HG	14	ENE	80	roost	170	
25/03/2020	18:10	HG	4	ESE	70	roost	120	

Appendix 3. Bat Survey Report

Three Oaks Renewable Energy Park: Baseline Bat Surveys 2020



Report to Ridge Clean Energy

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August 2022

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THREE OAKS RENEWABLE ENERGY PARK: BASELINE BAT SURVEYS 2020

Introduction

1. This report presents the bat survey work that has been carried out for the proposed Three Oaks Renewable Energy Park. The surveys were undertaken by Tom Lowe, Stuart Piner and Dr Steve Percival, all highly experienced ecological surveyors with over 20 years ecological surveying for renewable energy projects each (including bats, exceeding CIEEM competency requirements).

Study Area

2. The site is located approximately 1km north of Thornholme village and 5km south-west from Bridlington in East Yorkshire. The ecology survey area was chosen to include all areas within the potential zone of ecological influence of the Renewable Energy Park and a buffer around that to be contextual information on the area's bat populations. The survey area covered a total area of 7.5km² (see Figure 1). It is predominantly open arable farmland and lies within the 'Yorkshire Wolds' NE Natural Area.

Bat Survey Methods

3. The bat survey programme was designed with reference to the recent SNH/Natural England *et al.* (2019) guidance on 'Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation'. The surveys comprised the following:
 - Roost potential survey - to assess all potential roosts sites within the proposed development site and its surrounds;
 - Ground-level activity surveys – one transect-based survey each month from April-September. Surveys were carried out on 23 April, 21 May, 18 June, 22 July, 17 August and 17 September 2020. Access was restricted to the parts of the site that could be accessed safely at night - the transect routes walked are shown in Figure 1;
 - Automated surveys at ground level - static detectors were deployed at six locations across the survey area representative of the habitats available. Each location was sampled for a target minimum 30 nights covering spring (April/May), summer (June/July) and autumn (August/September). A total of 317 bat-nights' coverage was obtained. The locations of the recorders are shown in Figure 1.
4. Surveys at height were considered unnecessary at this site, given the generally low-quality bat habitats present (predominantly arable farmland).

Bat Survey Results

Bat roost assessment

5. The extended Phase 1 survey carried out on 29 September 2020 included an assessment of bat roost suitability. The results are summarised in Table 1, and the locations are shown in Figure 1. All of the potential bat roost sites were located around the fringes of the survey area, with none within the proposed development site itself (which was predominantly open arable farmland).

Table 1. Bat roost potential survey results (locations are shown in Figure 1).

Location number	Potential	Notes
1	Low	Small ash tree
2	Medium	Scattered ash trees
3	High	Larger trees within hedgerow
4	High	Many suitable trees (ash/oak) within hedgerow
5	Low	Small ash tree on southern side of road
6	High	Line of ash/oak trees along field boundary
7	High	Narrow belt of trees around building
8	High	Narrow belt of trees around building
9	High	Farm and residential buildings
10	Low	Smaller trees (ash) along southern side of road
11	High	Sycamore, ash and beech mature woodland
12	High	Residential buildings
13	High	Larger trees (mainly ash) within hedgerow
14	High	Wooded copse
15	Medium	Scattered trees around scrub
16	Medium	Trees (mainly ash) within hedgerow

6. With regard to commuting/foraging habitat for bats, the main areas that would be likely to be used include the hedgerows and field margins, and the edges of the small number of woodland plantations on the fringes of the survey area.

Bat walking transects

7. The results of the bat walking transect surveys are summarised in Table 2, which gives the number of passes recorded of each species on each monthly survey carried out between April and September 2020. Nine species were recorded in total, with common pipistrelle the most frequently encountered.

Table 2. Number of bat-passes recorded during the walkover transect surveys, April-September 2020.

Species	Scientific name	April	May	June	July	August	Sept
Brandt's bat	<i>Myotis brandtii</i>	1	0	0	0	2	2
Daubenton's bat	<i>Myotis daubentonii</i>	0	2	1	0	3	1
Whiskered bat	<i>Myotis mystacinus</i>	1	0	0	4	4	3
Natterer's bat	<i>Myotis nattereri</i>	2	0	0	1	0	2

Species	Scientific name	April	May	June	July	August	Sept
Unidentified <i>Myotis</i> bat	<i>Myotis sp</i>	2	0	0	2	0	0
Noctule	<i>Nyctalus noctula</i>	0	0	2	1	0	1
Nathusius' pipistrelle	<i>Pipistrellus nathusii</i>	0	1	0	0	0	0
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	0	15	19	34	5	1
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	0	18	0	0	0	0
Brown long-eared bat	<i>Plecotus auritus</i>	0	0	0	2	0	0

8. The distributions of bat records during these walkover surveys are plotted in Figure 2 (Common Pipistrelle) and other bat species (Figure 3). The number of locations are lower than the numbers of passes in Table 2 as a result of multiple passes being recorded at single locations. The highest concentration of bat records was along the land on the northern edge of the survey area, where the hedgerows were most well-developed and diverse. Most other records were associated with hedgerow habitats.

Bat static recorders

9. The results of the bat static surveys are summarised in Table 3. Bat pass rates are presented as medians, following Lintott *et al.* (2018). Common pipistrelle *Pipistrellus pipistrellus* was the most frequently recorded species, with peak numbers in summer at locations 2, 3 and 4. Soprano pipistrelle *Pipistrellus pygmaeus*, Daubenton's bat *Myotis daubentonii*, and brown long-eared *Plecotus auratus* were also recorded regularly, particularly during the autumn surveys. Five additional species were also recorded but in lower numbers: Nathusius' pipistrelle *Pipistrellus nathusii*, whiskered bat *Myotis mystacinus*, Brandt's bat *Myotis brandtii*, Natterer's bat *Myotis nattereri* and noctule *Nyctalus noctula*. Their median hourly pass rates were zero for all locations and seasons.

Table 3. Bat static recorder surveys, April-September 2020, showing the median number of bat passes per hour per night at each location.

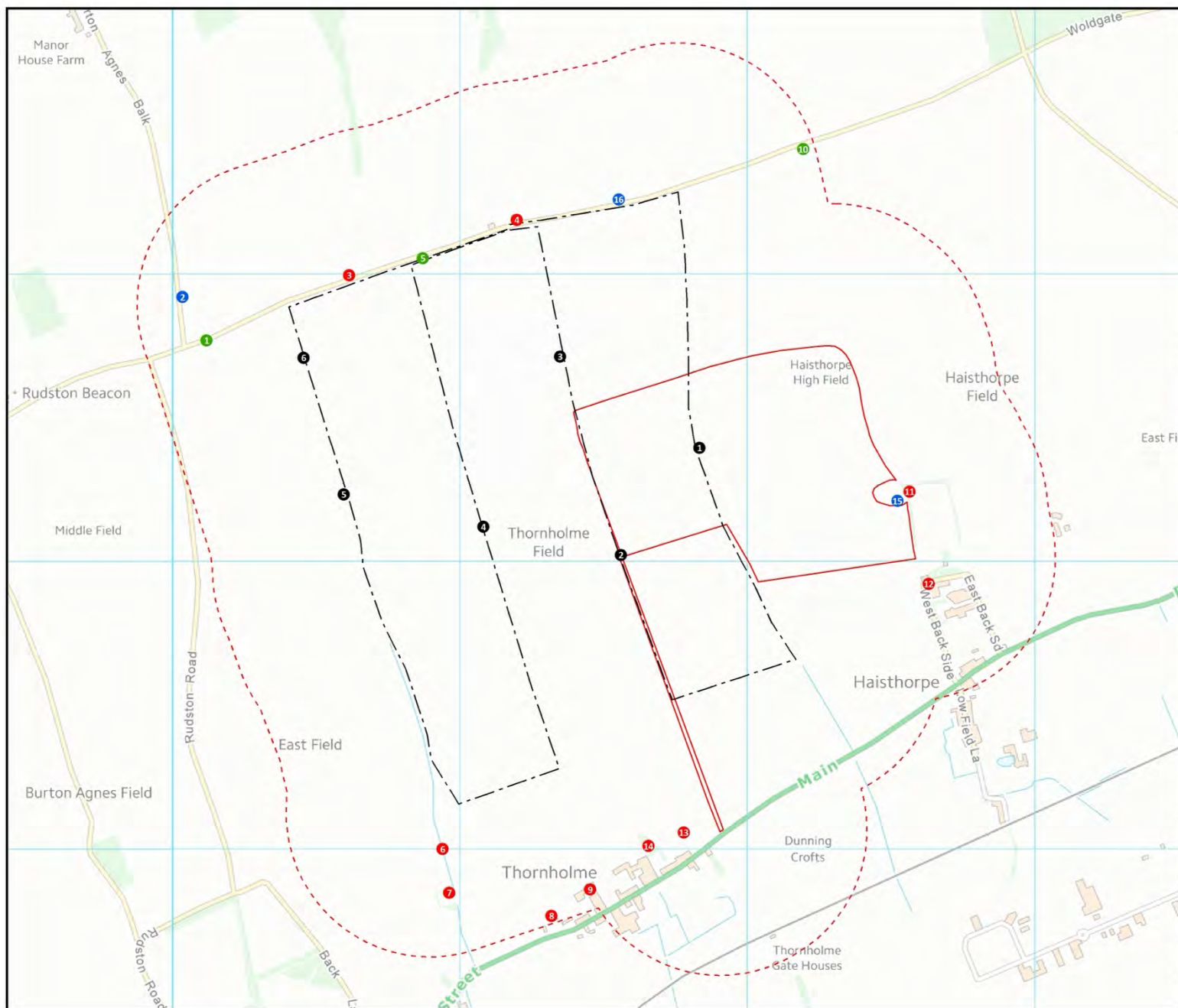
Species	Location	Spring (Apr/May)	Summer (Jun/July)	Autumn (Aug/Sep)	Total number of passes recorded
Common pipistrelle	1	0.38	0.55	0.54	805
	2	0.25	4.35	0.55	1947
	3	0.38	3.73	1.03	2119
	4	0.96	3.68	0.30	2063
	5	0.27	0.07	0.43	207
	6	0.26	0	0	194
Soprano pipistrelle	1	0	0	0	370
	2	0	0	0	46
	3	0	0	0	113
	4	0	0	0	44
	5	0	0	0.09	16
	6	0	0	0	9
Brown long-eared bat	1	0	0	0	47
	2	0	0	0	223
	3	0	0	0	207
	4	0	0	0.04	3
	5	0	0	0	4

Species	Location	Spring (Apr/May)	Summer (Jun/July)	Autumn (Aug/Sep)	Total number of passes recorded
	6	0	0	0	3
Daubenton's bat	1	0	0	0.18	57
	2	0	0	0.09	30
	3	0	0	0	18
	4	0	0	0.04	15
	5	0	0	0.17	31
	6	0	0	0.13	51
<i>Myotis</i> sp.	1	0	0	0.38	90
	2	0	0	0.64	160
	3	0	0	0.19	116
	4	0.13	0	0.30	88
	5	0.14	0	0.72	77
	6	0.13	0	0.29	92



Three Oaks Renewable Energy Park: Bat Surveys

FIGURE 1
Survey Area, Transect
Route and Static
Detector Locations



- KEY:**
- Site Boundary and Access
 - Ecology Survey Area
 - Static Detector Locations
 - Transect Survey Route
- Bat Roost Potential:**
- High
 - Medium
 - Low



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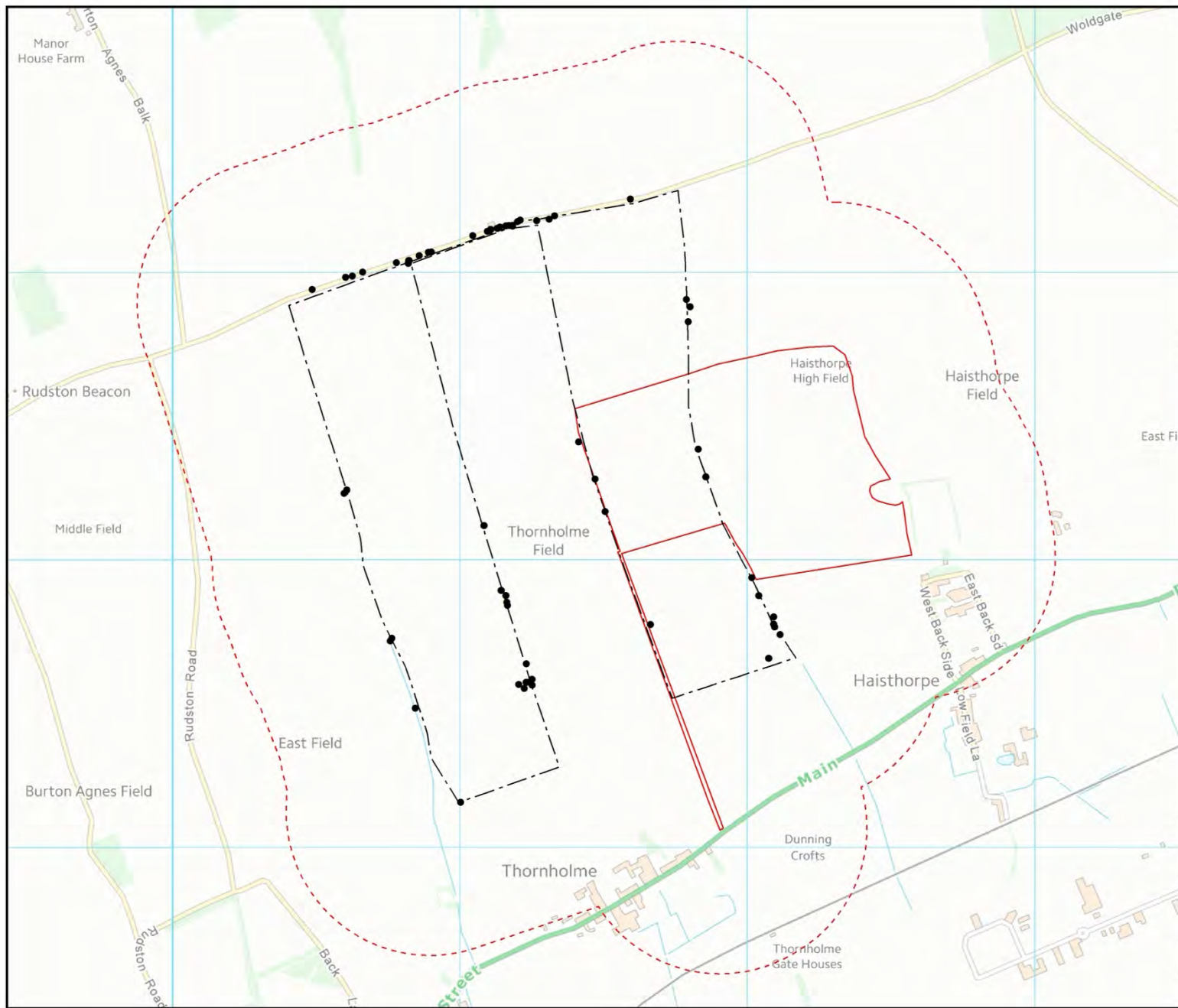
LAYOUT DATE	N/A	LAYOUT NO.	N/A
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ISSUE NO.	n/a
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SCALE - 1:12,500 @ A3

BAT SURVEYS
2020

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Three Oaks Renewable Energy Park: Bat Surveys

FIGURE 2

Transect Survey: Common Pipistrelle

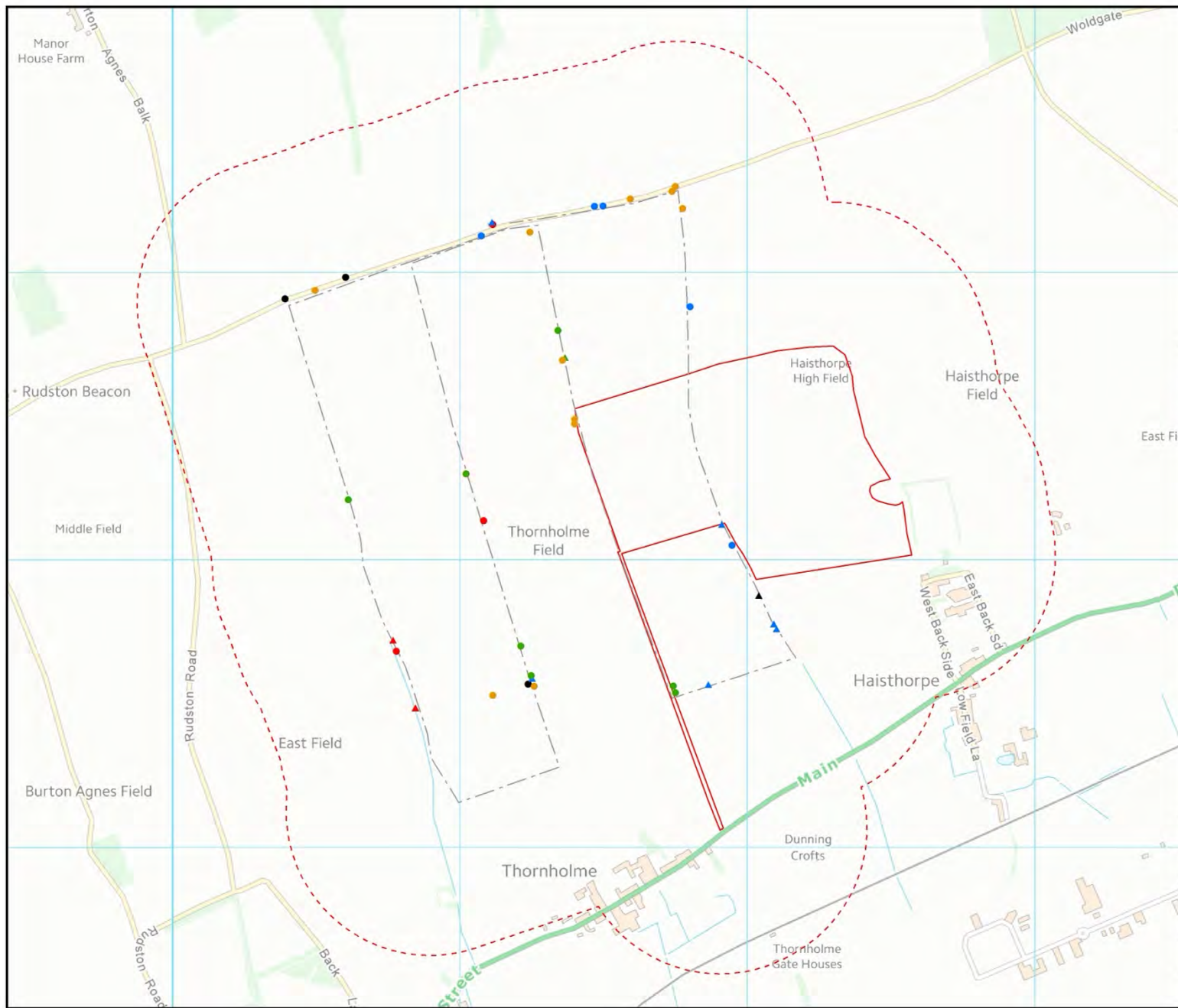
KEY:

- Site Boundary and Access
- Ecology Survey Area
- BatWalkoverData2020
- Transect Survey Route



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Three Oaks Renewable Energy Park: Bat Surveys

FIGURE 3


Transect Survey: Other Bat Species

KEY:

- Site Boundary and Access
- Ecology Survey Area
- Transect Survey Route

Bat Records:

- Brandt's
- Daubenton's
- Whiskered
- Natterer's
- Myotis sp
- ▲ Noctule
- ▲ Nathusius' Pipistrelle
- ▲ Soprano Pipistrelle
- ▲ Brown Long-eared

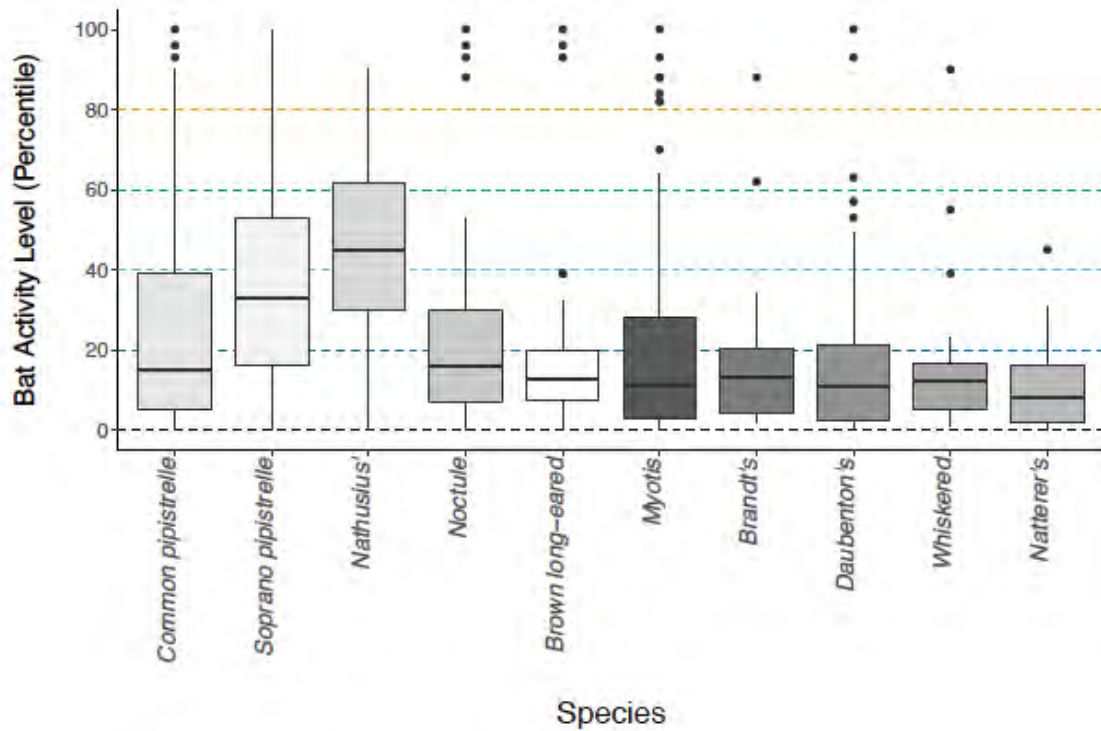


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BAT SURVEYS 2020	
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10. The static bat recorder data also provided information on the likelihood of any important bat roost being located within or in proximity to the site. If bats were roosting on or near to the site, then there would likely be records of bat contacts at, or soon after, the typical emergence times. Noctules can emerge before sunset whereas common pipistrelles and soprano pipistrelles tend to emerge within the first 10-30 minutes after sunset. *Myotis* bats will typically emerge later than pipistrelles, with Daubenton's bats emerging up to an hour after sunset. ECOBAT (Lintott *et al.* 2018) was used to analyse the times of bat records comparing them to published emergence times for each species (Russ 2012). Occurrence of bat passes recorded during roost emergence time was as follows:
- Location 1 – frequent common pipistrelle, occasional *Myotis* sp./Daubenton's and brown-long-eared bat
 - Location 2 – occasional *Myotis* sp., low numbers of Daubenton's, brown-long-eared bat and common pipistrelle.
 - Location 3 – occasional common pipistrelle, low numbers of *Myotis* sp and soprano pipistrelle.
 - Location 4 – low numbers of *Myotis* sp.
 - Location 5 – occasional *Myotis* sp., low numbers of Daubenton's.
 - Location 6 - low numbers of Daubenton's and *Myotis* sp.
11. Overall, the number of bat passes recorded during roost emergence time was low, indicating that there were not likely to be any important roosts located within/in proximity to the survey area. There were, however, more records of common pipistrelle around roost emergence time at Location 1. This location is the most easterly of the six, and the bats recorded here at emergence time are most likely to have originated from roosts in the woodland and buildings to the east of the proposed renewable energy park (Haisthorpe – points 11 and 12 on Figure 1).
12. Recent SNH *et al.* (2019) guidance recommends the use of ECOBAT (Lintott *et al.* 2018) to standardise the determination of the relative importance of the site for its bat populations. This software tool uses percentiles to assign a bat activity comparing with data from other sites collected within the same season (within 30 days of the surveys) and within 100km of the site:
- **High** - above 80% percentile
 - **Moderate/high** - 60-80%
 - **Moderate** - 40-60%
 - **Low/moderate** - 20-40%
 - **Low** - 0-20%
 - **Nil** - no records.
13. The results of the overall whole site ECOBAT analysis are summarised in Figure 4. This presents the median activity level percentile (solid horizontal line), the interquartile range (box plot) and the spread of any outliers. Overall activity was classed as follows:
- **High:** no species
 - **Moderate/high:** no species
 - **Moderate:** Nathusius' pipistrelle
 - **Low/moderate:** Soprano pipistrelle
 - **Low:** Common pipistrelle, Noctule, Brown long-eared bat, *Myotis* sp., Brandt's, Daubenton's Whiskered and Natterer's bats.

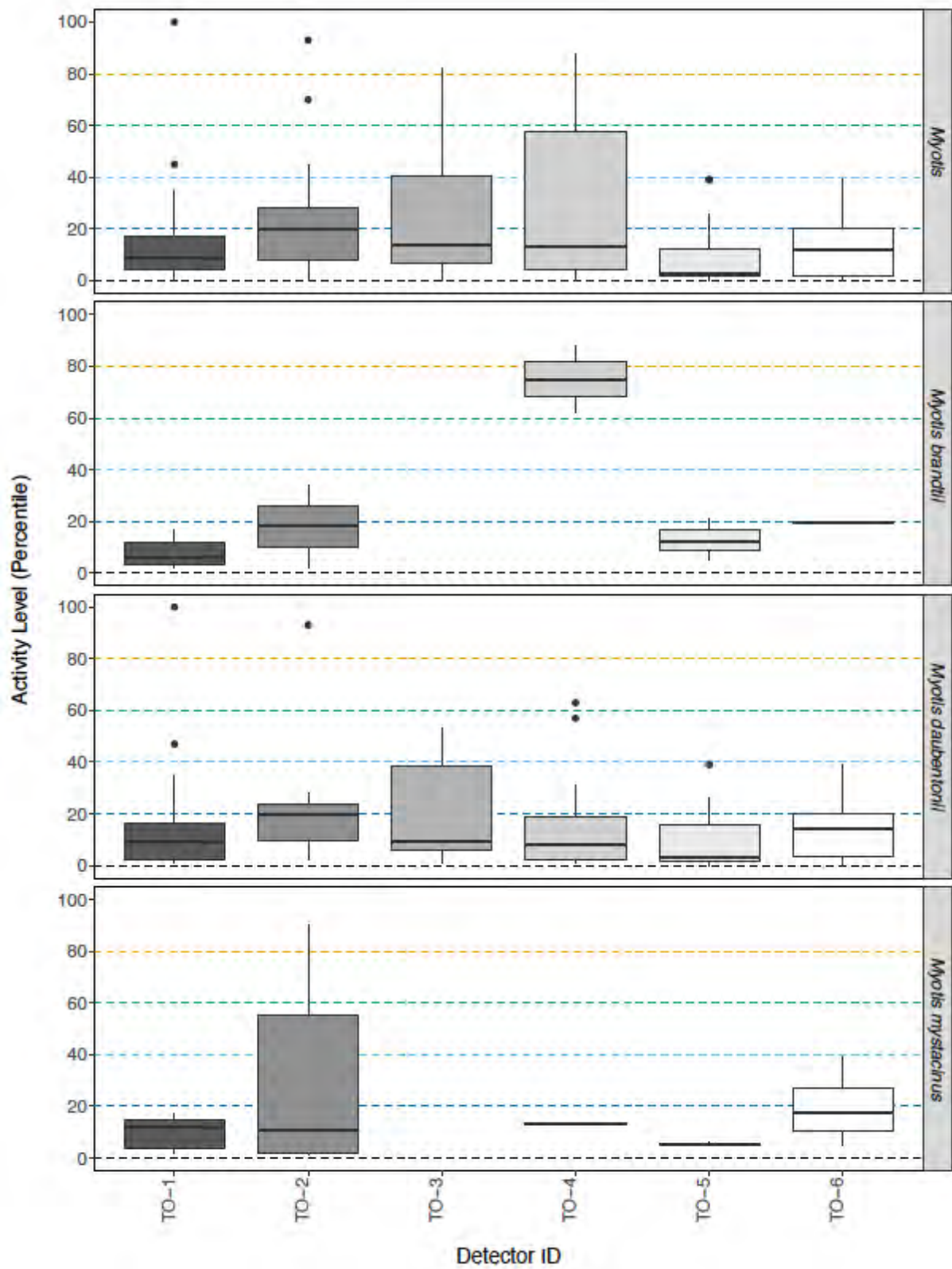
Figure 4. ECOBAT site activity analysis: bat activity level (percentile) recorded across each night of the bat survey for the whole site.

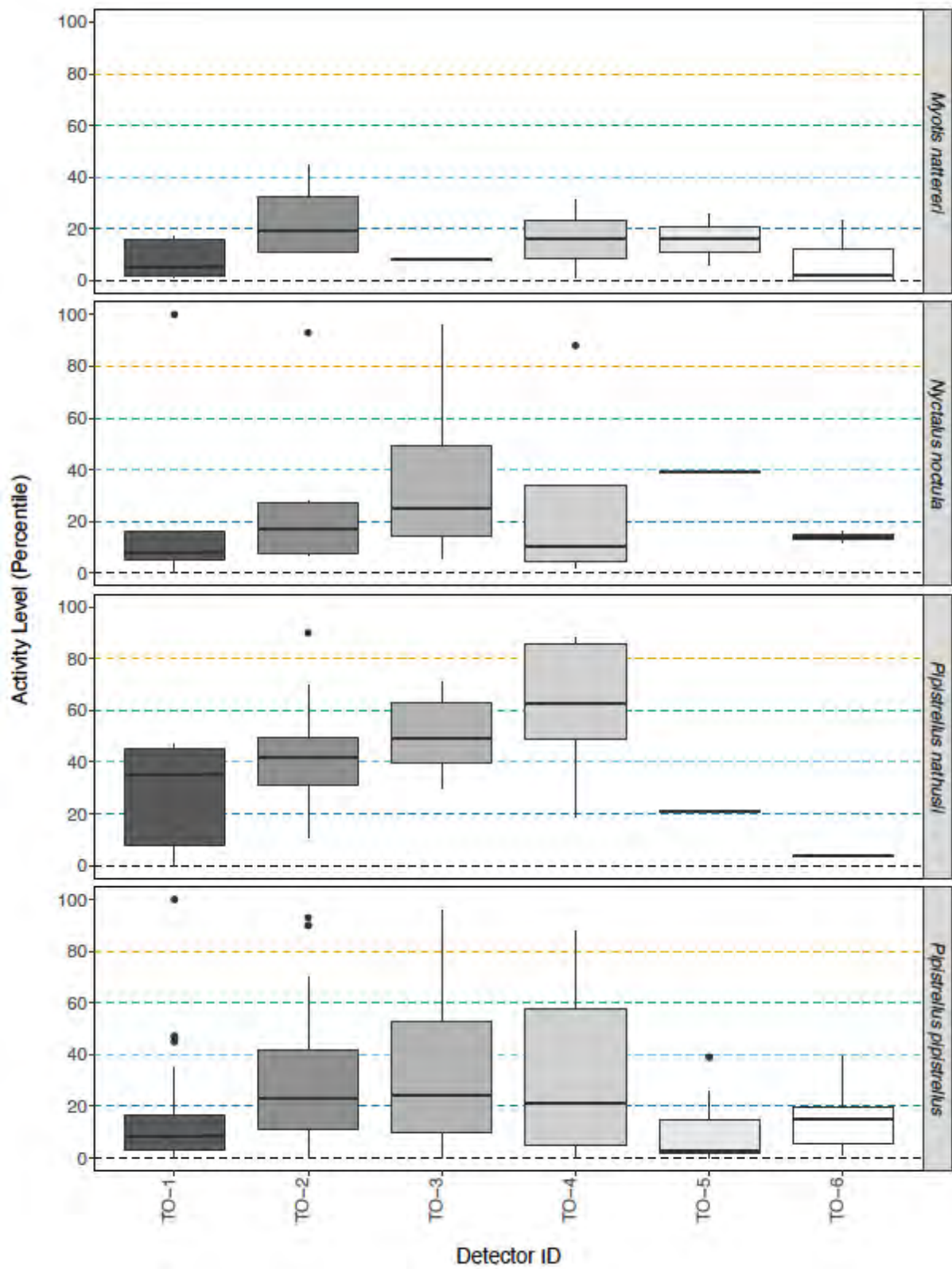


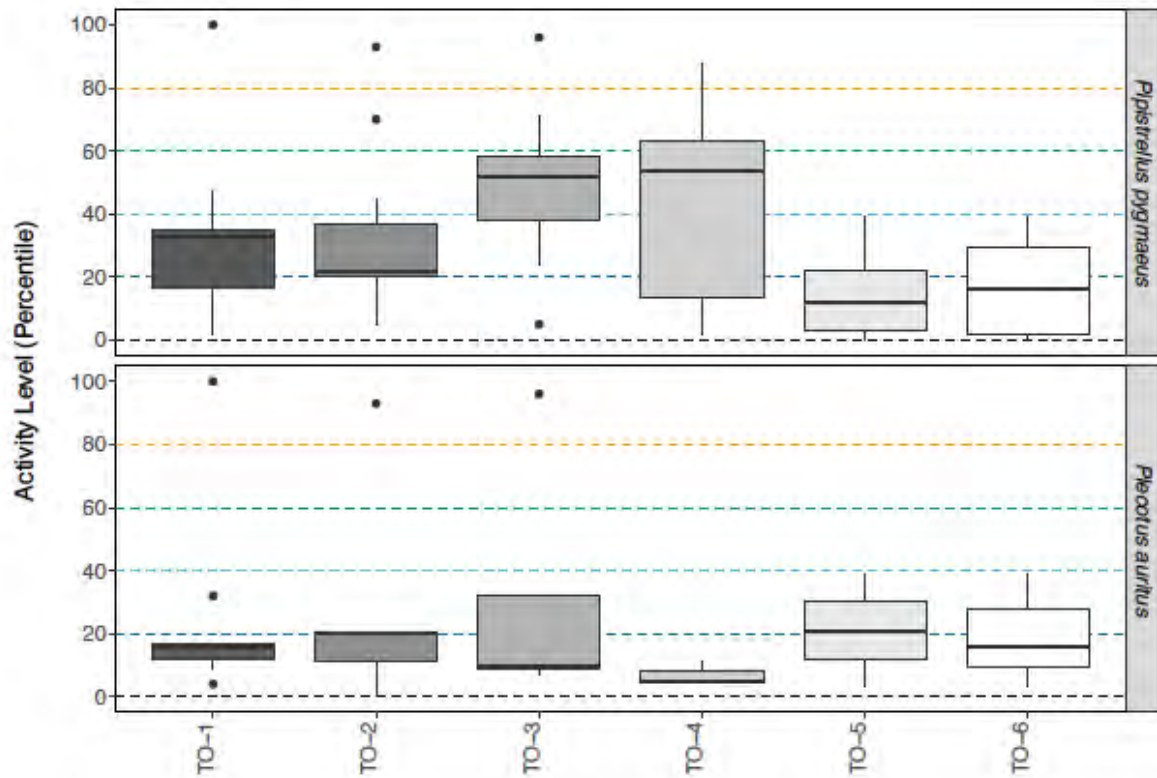
14. Figure 5 shows the activity levels of these species over the whole survey period at each of the six survey locations. As for the whole site analysis presented above, these are plotted as percentiles of activity levels recorded each night, and show the relative abundance of each species at each location in comparison with the ECOBAT reference data set. Overall, it shows further the generally low levels of bat activity across the site, though higher levels of some species were recorded at some locations:

- Brandt's bat – moderate/high activity at location 4.
- Nathusius' pipistrelle – moderate activity at locations 2 and 3, moderate/high levels at location 4.
- Soprano pipistrelle - moderate activity at locations 3 and 4.

Figure 5. ECOBAT activity analysis by recorder location: bat activity level (percentile) recorded across each night of the bat survey for each of the six survey locations (see Figure 1).







Conclusions

15. The baseline bat surveys have shown the survey area to hold generally low levels of bat activity. Nine species of bat were recorded in total during the surveys. Common pipistrelle was much the most frequently recorded species, with soprano pipistrelle, Daubenton's bat and brown long-eared also frequently encountered, particularly during the autumn surveys. Other less abundant species comprised: Nathusius' pipistrelle, whiskered bat, Brandt's bat, Natterer's bat and noctule.
16. Comparison of bat activity levels recorded at the site with the ECOBAT (Lintott *et al.* 2018) reference database confirmed the generally low activity levels at the site. Only two species, Nathusius' pipistrelle and soprano pipistrelle, exceeded a low level of activity across the site overall (moderate/high and moderate levels of those species were recorded respectively).
17. The bat numbers recorded within the proposed development were generally low, reflecting the low quality bat habitat across the survey area. The proposed Renewable Energy Park would not affect any bat roosting habitat, and hedgerow loss would be minimal (and any losses would be compensated by new planting), so effects on bats should be negligible. In addition, the conversion of the development site from arable farmland to wildflower meadow will enhance the bat habitat overall and should deliver a clear net gain to these species.

References

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Appendix 4. Phase 1 Habitat Survey Target Notes

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Target Note	Feature
1	Small ash tree. Low bat roost potential
2	Scattered ash trees. Medium bat roost potential
3	Larger trees within hedgerow. High bat roost potential
4	Many suitable trees (ash/oak) within hedgerow. High bat roost potential
5	Small ash tree on southern side of road. Low bat roost potential
6	Line of ash/oak trees along field boundary. High bat roost potential
7	Narrow belt of trees around building. High bat roost potential
8	Narrow belt of trees around building. High bat roost potential
9	Farm and residential buildings. High bat roost potential
10	Smaller trees (ash) along southern side of road. Low bat roost potential
11	Sycamore, ash and beech mature woodland. High bat roost potential
12	Residential buildings. High bat roost potential
13	Larger trees (mainly ash) within hedgerow. High bat roost potential
14	Wooded copse. High bat roost potential
15	Scattered trees around scrub. Medium bat roost potential
16	Trees (mainly ash) within hedgerow. Medium bat roost potential
17	Start of stream: dry to N
18	Tall ruderal with nettle and rosebay willowherb
19	Maize strip (game cover)