



APPENDIX 11.3 EAST HILL, HEMPSTEAD, MEDWAY

BAT SURVEY REPORT

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1.0 INTRODUCTION

1.1 Corylus Ecology has undertaken bat evening emergence and activity surveys at East Hill, Hempstead, Medway hereinafter referred to as 'the Site'. The OS grid reference at the Site centre is TQ 77516 65355. These surveys have been recommended after initial ecological scoping surveys were undertaken of the Site in 2017 and early 2018.

Summary

1.2 During the Extended Phase I Habitat Survey the habitat was assessed for potential for bats. The Site contains a mixture of low quality and high quality habitats, the arable fields that form the majority of the Site are poor quality habitat for foraging bats. However the vegetated boundaries do provide good quality linear features for commuting and foraging and the two large blocks of Ancient Woodland within and adjacent to Field 1 provide larger areas of suitable bat foraging habitat.

1.3 The Site consists of three large arable fields located within the large Medway Towns area approximately 1.5km to the west of Hempstead and 2.7km to the south of Chatham. To the north and west of the Site is urban development, and to the south and east are arable fields, woodland blocks and a country park. The Site has good connections to the suitable surrounding habitats to the east and south. Overall, the Site is assessed as 'Moderate' quality habitat for commuting and foraging bats under the Bat Conservation Trust Guidelines (Collins 2016).

Scope of Survey

1.4 The aims of the bat surveys were to:

- Determine the presence/likely absence of roosting bats in trees identified as being suitable for roosting bats;
- Identify the bat species present on Site;
- Identify key areas of habitat for bats including hibernation potential; and
- Evaluate the importance of the bat assemblage within the Site.

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Records of bats were sought from the Kent and Medway biological Records Centre encompassing a 3km to 5km search area. Internet resources were used such as Multi-Agency Geographic Information for the Countryside (MAGIC) interactive mapping service (DEFRA, 2018).

2.2 Bat Tree and Habitat Assessment

2.2.1 The aim of this assessment is to determine the suitability of the Site for bats and assess whether further surveys should be undertaken. In addition, trees were also assessed for potential bat roosts such as cracks or holes (such as woodpecker holes), splits or flaking bark and ivy (JNCC, 2004). Field signs to look for include dark streaking below holes and crevices, droppings under access points. Chattering noises emitted by bats may also be audible, particularly during the summer, however, even where bats are known to occur, such signs are not always evident.

2.2.2 As with the building and tree assessment, the habitats are placed into one of the following categories, see Table 1 below;

Table 1 – Bat Habitat/Building Assessment Criteria

NEGLIGIBLE	Habitat, tree or building with negligible features likely to be used by roosting, foraging or commuting bats
LOW	<p>A structure or tree with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space for shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation).</p> <p>A habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated i.e. not well connected to the surrounding landscape by other habitat</p>
MODERATE	<p>A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost with high conservation status.</p> <p>Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens.</p>
HIGH	<p>A structure or tree with one or more potential roost sites that obviously suitable or use by larger numbers of bats on a more regular basis and potentially for the longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.</p> <p>Continuous, high quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, hedgerows, line of trees and woodland edge.</p>

- 2.2.3 Trees were also noted if they supported ivy *Hedera Helix*. Ivy can do one of two things; very old, dense ivy can provide cavities for bats between the thick interwoven stems and the tree trunk or it can conceal features in the tree itself. The former would be classed as Moderate, the latter would be Low.

Bat Hibernation Assessment

- 2.2.4 Maps of the Site show that 'deneholes' which are artificial chalk extraction holes are located within the wider local area. During the surveys these underground features were searched for.

2.3 Bat Activity and Emergence Surveys

Bat Transect Surveys

- 2.3.1 Three transect surveys were undertaken during June, July and September 2018. Two surveyors carried out the survey during each session of surveying. The aim of the transect surveys was to provide information during the active season, including the main breeding period.
- 2.3.2 Transects were identified before the surveys and monitoring points marked along their length (see Figure 1). They were planned to cover as much of the Site which is likely to be affected as possible and designed to include areas of key habitat type and structures such as woodland edge, hedgerows and the field boundaries, with the monitoring points at intersection points. It should be noted that the length of each section of transect between monitoring points was not standardised to a set length. This is because no statistical analysis is to be undertaken regarding the numbers of bats in specific areas or types of habitat.
- 2.3.3 The transects commenced approximately 45 minutes after sunset, preceded by an emergence survey of a tree with bat potential, or static observation to look for the direction of flight by the first bats within the Site. The BCT guidelines state that transects should commence $\frac{1}{4}$ hour before sunset, however, the methodology used follows Warren, Waters *et al* 2000. If transects commenced $\frac{1}{4}$ hour prior to sunset, the first 30 minutes or so would have no bat passes. This would result in a bias of negative results for those parts of the Site that are walked during those first 30 minutes and bias the first 45 minutes towards earlier emerging species such as *Nyctalus* and *Pipistrelle* bats. The aim of this transect survey was to identify key commuting and foraging habitats within the Site, therefore the survey started with a static point (coincidental with the emergence survey of a tree and vantage point survey of the immediate area), with the transect starting during the main active period and continuing for approximately 2hrs after sunset. On each evening the time of every bat pass, the species and (where it was possible to observe) information regarding the behaviour, for example foraging and flight direction, were recorded. *Elekon Batloggers* were used and calls subsequently analysed on 'Bat Explorer' software.

Tree Emergence Surveys / Vantage Point Surveys

2.3.4 The Bat Tree Assessment undertaken by Corylus Ecology in March 2018 identified two trees across the Site with potential to support roosting bats. These trees are located within the Site boundaries that are to be retained and not directly affected by the proposals. The transect surveys therefore began with the two surveyors observing trees with suitable roosting features, as well as the whole woodland edge, for bat activity. The tree emergence/vantage point surveys began 15 minutes before sunset and continued until the transect surveys began 45 minutes after sunset.

Static Monitoring Surveys

2.3.5 In addition to transect surveys, *Wildlife Acoustics SM3 and SM4* static detectors were set at Static Monitoring Points (SMPs). A total of four detectors were set: two on each transect route (see Figure 1). Static detectors were positioned in suitable locations in opposite corners of each field. The detectors were installed for five consecutive nights during May, July and September 2018.

- 16th – 21st May 2018
- 19th – 24th July 2018
- 31st August – 5th September 2018

Bat Sound Analysis

2.3.6 The sonograms were subsequently up-loaded onto the computer software '*BatSound V.3.31*', '*Analook*' and '*Bat Explorer*' for analysis. The sonograms were analysed and compared to identification parameters given in Parsons and Jones 2000 and Russ 1999 & 2013 and also compared with library recordings made by the surveyors.

2.4 Survey Constraints

2.4.1 There were no constraints to the surveys. However, with bat sound analysis it is not always possible to identify each bat pass to species level due either to poor recordings of their echolocations or due to similarities between echolocations of bat species not allowing confidence of identification. Bats will also vary their echolocation in different habitats and their calls may therefore not always resemble 'typical' echolocation calls. Where identification has not been possible suggestions of likely bat species have been provided.

2.4.2 The pipistrelle bats can often be confidently identified by the frequency at which the peak energy is recorded, around 45kHz for the common pipistrelle and around 55kHz for the soprano pipistrelle. However, there is a level of overlap, for example Russ (1999) records the soprano pipistrelle's peak frequency to be as low as 48.8kHz, whilst that of the common pipistrelle may be as high as 49.5kHz. Where pipistrelles were recorded the peak frequency recorded was therefore checked. Where sonograms

show the peak frequency as being within this overlap, this is recorded as an unidentified pipistrelle unless another feature such as a social call can be used to differentiate the bat to species level.

- 2.4.3 The *Myotis* genus is generally the hardest to separate to species level due to the plasticity of the calls and overlapping of call characteristics between the different species. Where the sonogram quality has allowed, parameters including call duration, pulse interval, start frequency, end frequency and peak energy have been recorded.

3.0 RESULTS

3.1 Desk Study

3.1.1 Kent Bat Group have provided over 400 records of bats from within a 3km radius of the Site, 141 of these records are of roosting bats. Ten species of bat have been recorded: serotine, Daubenton's, whiskered, Natterer's, Leisler's, noctule, Nathusius' pipistrelle, common and soprano pipistrelle and brown long-eared bat. There are 141 records of roosting bats from within a 3km radius of the Site. The nearest of these records is of an unknown roost type within the woodland in the east of Field 3 (or in an adjacent building on Capstone Road) in 1995. There are five records of hibernating bats from within a 3km radius of the Site. The nearest record is from approximately 60m to the south of Field 3 within Capstone Farm Country Park: eight serotines were recorded hibernating here in 1990. There are seven records of maternity roosts within a 3km radius and the closest record to the Site is located approximately 0.7km to the north-west: a maternity roost of serotines was present at an address on King's Road between 1990 and 2000, with a peak count of 29 bats in 1990 and nine bats in 2000.

3.1.2 A single licence which permitted the destruction of a resting place of common pipistrelle bat *Pipistrellus pipistrellus* and brown long-eared bat *Plecotus auritus* between 2012 and 2013 is registered approximately 4km to the south-west of the Site.

3.2 Bats Roost Potential Assessment

Trees

3.2.1 Trees with the potential to support bat roosts were assessed on Site. There are limited mature trees located within the Site and these are all confined to the Site boundaries. The trees have been assigned Low – High potential under the Bat Conservation Trust Guidelines (Collins, 2016). The trees identified as suitable have been summarised in Table 2.

Table 2 - Bat Tree Schedule

ID	Species	DBH	Features	Category	OS Grid Reference
T1	Sweet Chestnut	0.7m	Mature sweet chestnut, single stem, in poor health with crown dieback occurring. Branch extending to south has multiple woodpecker holes within at c.10m high	Moderate - High	TQ 77791 65787
T2	Pendunculate oak	0.5m	Mature oak tree on eastern bank of Shawstead Road, single stem and appears in good health. Split in limb extending to the west at 6m high	Moderate	TQ 77532 64999

T3	Pendunculate oak	0.6m	Mature oak tree on eastern bank of Shawstead Road, single stem and appears in good health, no bat roost features identified.	Low	TQ 77533 64994
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Bat Hibernation Assessment – Deneholes

3.2.2 Deneholes are known to be present within the local area with four noted on OS survey plans within 1km of the Site and the closest being located 120m to the east of Field 3, adjacent to Pear Tree Lane. Three deneholes are also present within Grove Wood located 890m to the east. These features provide suitable habitat for hibernating bats as they are cool, humid and sheltered. During the surveys no Deneholes were found to be located within or adjacent to the Site. The nearest denehole located 120m to the east was found to be suitable for use by hibernating bats with access into the chambers below, however the size, layout and structure of the feature is unknown to access limitations.

3.3 Emergence and transect survey results

4th June 2018, sunset 21:06hrs

3.3.1 Emergence surveys were carried out on T1 and T2 prior to the transect commencing.

3.3.2 No bats emerged from tree T2, however a single common pipistrelle *Pipistrellus pipistrellus* emerged from a woodpecker hole high within tree T1 at 21:17hrs, 11 minutes after sunset. This was the earliest bat pass of the survey recorded by the surveyor at this location. During the vantage point and emergence survey at T2, 24 bat passes were recorded of which 23 were common pipistrelles and one was soprano pipistrelle *Pipistrellus pygmaeus*. These passes were a mixture of foraging and commuting activity with bats seen moving along the vegetation line here in all directions.

3.3.3 A total of 276 bat passes were recorded during the survey with 132 bat from three bat species common pipistrelle, soprano pipistrelle and noctule bat recorded in the southern half of the Site around Field 1. Several social calls by pipistrelle bats were also recorded. The earliest bat recorded was a noctule at 21:20hrs, 14 minutes after sunset. 6 bat passes were recorded during the emergence survey. The areas with the highest levels of bat activity was the edge of the Ancient woodland 'Whites Wood' at points 1N and 1Q as well a northern edge point 1A. A high level of foraging was recorded in both of these locations. The dominant species recorded in Field 1 of the Site was common pipistrelle, contributing 93% of the total passes. Figure 1 shows the transect route and Figure 3 the survey results in detail.

3.3.4 In the northern half of the Site, a total of 144 bat passes from four species were recorded during the transect survey: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle *P. nathusii* and noctule bat *Nyctalus noctule*. Several social calls by pipistrelle bats were also recorded. The areas with the highest levels of bat activity was the area of central scrub at transect points 2F and 2E. A high level of foraging was recorded in both of these locations. The dominant species recorded in Fields 2 and 3 of the Site was

common pipistrelle, contributing 91% of the total passes. Figure 2 shows the transect route and Figure 3 survey results in detail.

Tables 1: Summary of bat passes recorded during the transect survey in June

Surveyor 1 – Transect Route 1

Species	Number of Passes	Percentage %
Pipistrellus pipistrellus	123	93.18
Pipistrellus pygmaeus	8	6.06
Nyctalus noctula	1	0.76
Total	132	

Surveyor 2 – Transect Route 2

Species	Number of Passes	Percentage %
Pipistrellus pipistrellus	132	91.67
Pipistrellus pygmaeus	10	6.94
Pipistrellus nathusii	1	0.69
Nyctalus noctula	1	0.69
Total	144	

31st July 2018, sunset 20:48hrs

- 3.3.5 Emergence surveys of T1 and T2 recorded no bats emerging and in addition no bat foraging or commuting passes by any bats were recorded by either surveyor during the emergence survey.
- 3.3.6 A total of 65 passes were recorded during the transect surveys. A total of 32 bat passes in the north from a single bat species common pipistrelle. Several social calls by this species were also recorded. The earliest bat recorded was at 21:43hrs, 55 minutes after sunset. The areas with the highest levels of bat activity was the edge of the offsite Ancient woodland 'North Dane Wood at points 1H and 1I. Foraging was recorded in both of these locations. Figure 1 shows the transect route and Figure 4 the survey results in detail.
- 3.3.7 A total of 33 bat passes were recorded in the southern section from two species: common pipistrelle (30 passes) and soprano pipistrelle (3 passes). Several social calls by common pipistrelle bats were also recorded. The earliest bat recorded was at 21:17hrs, 29 minutes after sunset. The areas with the highest levels of bat activity was the area of central scrub at transect points 2F and 2E as well as the southern boundary of Field 3 at point 2I. Foraging activity was recorded in both of these locations.

Table 2: Summary of bat passes recorded during the transect survey in July

Surveyor 1 - Transect Route 1			Surveyor 2 – Transect Route 2		
Species	Number of Passes	Percentage %	Species	Number of Passes	Percentage %
Pipistrellus pipistrellus	32	100.00	Pipistrellus pipistrellus	30	90.91
Total	32		Pipistrellus pygmaeus	3	9.09
			Total	33	

4th September 2018, sunset 19:38hrs

- 3.3.8 No bats emerged from the trees T1 or T2. The first bats recorded were two common pipistrelle bats at 19:57hrs, 19 minutes after sunset. These bats were seen foraging at point 1A in the north-west corner of Field 1.
- 3.3.9 The transect surveys recorded 154 passes by two species: common and soprano pipistrelle. In the north 69 bat passes all by common pipistrelle were recorded. Several social calls by this species were also recorded. The earliest bat recorded was at 19:57hrs, 19 minutes after sunset. The areas with the highest levels of bat activity was the edge of the offsite Ancient woodland 'North Dane Wood at points 1M, 1N and 1l as well as the northern boundary of Field 1 at points 1A and 1B. Foraging was recorded in both of these locations.
- 3.3.10 In the south, 85 bat passes were recorded, 76 by common pipistrelle and nine by soprano pipistrelle. Several social calls by common pipistrelle bats were also recorded. The earliest bat recorded was at 19:57hrs, 19 minutes after sunset. The areas with the highest levels of bat activity was the area of central scrub at transect points 2F, 2G and 2E as well as the southern boundary of Field 3 at point 2J. Foraging behaviour was recorded in both of these locations.

Table 3: Summary of bat passes recorded during the transect survey in September

Surveyor 1			Surveyor 2		
Species	Number of Passes	Percentage %	Species	Number of Passes	Percentage %
Pipistrellus pipistrellus	69	100.00	Pipistrellus pipistrellus	76	89.41
Total	69		Pipistrellus pygmaeus	9	10.59
			Total	85	

3.3.11 Figures 3 to 5 shows the transect routes and the areas where the highest levels of bat activity were recorded, or 'bat activity hotspots' across all transects.

3.4 **Static monitoring survey results**

3.4.1 During each period five nights of data were recorded with all bat sound files analysed. Over the course of the three months of surveys at least eight species of bat were recorded:

- Common pipistrelle May, July and September
- Soprano pipistrelle May, July and September
- Myotis July and September
- Noctule May and September
- Leislers May and September
- Long-eared July
- Serotine September at SMP1 only
- Nathusius September at SMP2 and SMP3 only

3.4.2 The largest number of passes recorded was in May with a total of 5,562 bat passes recorded compared to 1914 in July and 2589 in September. The number of passes remained fairly consistent at SMP1 with between 530 and 594 bat passes recorded during the three surveys compared to SMP2 where 2731 passes were recorded in May (2644 of these being by common pipistrelle) compared to 428 in July and 747 in September. The reduction was largely due to the number of common pipistrelles recorded. Similar reductions in pipistrelle activity were recorded at SMP's 3 and 4 with the activity levels at SMP3 changing from 1895 in May to 773 in July and 923 passes in September. Again this was largely due to the reduction in common pipistrelle passes.

3.4.3 The species diversity also varied slightly during the surveys. For example long-eared bats were only recorded on the static detectors during July whilst serotine was recorded on SMP1 only and only in September. Nathusius pipistrelle bats were recorded in September on SMP's 2 and 3 only. Noctule and Leisler's bats were recorded in May and September but not in July. The numbers of passes by these other species of bats were all low, singleton passes in most cases, with the exception of noctule where 40 passes were recorded in May on SMP1.

3.4.4 A summary of the passes is presented in Table 4, showing species composition at the four SMP locations:

Table 4: Summary of static bat passes

SMP1	May		July		September		Total
Species	Passes	%	Passes	%	Passes	%	
Common pipistrelle	509	96.04	516	90.53	521	87.71	1546
Soprano pipistrelle	16	3.02	22	3.86	57	9.6	95
Noctule	3	0.57			9	1.52	12
Leisler's	2	0.38			3	0.51	5
Myotis sp.	0	0	1	0.18	1	0.17	2
Long-eared bat			31	5.44			31
Serotine					3	0.51	3
Total	530		570		594		1694

SMP2	May		July		September SMP2		Total
Species	Passes	%	Passes	%	Passes	%	
Common pipistrelle	2644	96.81	410	95.79	726	97.19	3780
Soprano pipistrelle	36	1.32	15	3.5	10	1.34	61
Noctule	40	1.46			4	0.54	44
Leisler's	11	0.4			2	0.27	13
Myotis sp.					3	0.4	3
Long-eared bat			3	0.7			3
Nathusius pipistelle					2	0.27	2
Total	2731		428		747		3906

SMP3	May		July		September		Total
Species	Passes	%	Passes	%	Passes	%	
Common pipistrelle	1892	99.84	769	99.48	902	97.72	3563
Soprano pipistrelle	0	0	1	0.13	2	0.22	3
Noctule	1	0.05			9	0.98	10
Leisler's	2	0.11			5	0.54	7
Myotis sp.	0	0	1	0.13	1	0.11	2
Long-eared bat			2	0.26			2
Nathusius pipistelle					4	0.43	4
Total	1895		773		923		3591

SMP4	May		July		September		Total
Species	Passes	%	Passes	%	Passes	%	
Common pipistrelle	388	95.57	136	95.1	310	95.38	834
Soprano pipistrelle	16	3.94			4	1.23	20
Noctule	1	0.25			5	1.54	6
Leisler's	1	0.25			3	0.92	4
Myotis sp.	1	0.25	3	2.1	3	0.92	7
Long-eared bat			4	2.8			4
Total	406		143		325		875
Total all Statics	5562		1914		2589		10066

4.0 EVALUATION

4.1 Survey Justification

4.1.1 The Site has been assessed as overall as 'Moderate' quality habitat for commuting and foraging bats, however the vast majority of the Site area is comprised of 'Low' quality intensively farmed arable fields with monoculture crops of wheat. However the vegetated boundaries do provide higher quality linear features for commuting and foraging and the two large blocks of Ancient Woodland within and adjacent Field 1 provide larger areas of suitable bat foraging habitat. Adjacent habitats to the Site to the north and west of the Site is dense urban development and roads, and to the south and east are arable fields, woodland blocks and a country park proving links to the wider landscape.

4.1.2 The BCT Good Practice Guidelines (3rd edition) outlines low and moderate quality habitats as below:

Low Quality Habitats

Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.

Moderate Quality Habitats

Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.

4.1.3 Due to the quality of habitats within the Site and its location within the wider landscape and the proposals to retain, protect and enhance the higher quality boundary habitats as part of the scheme, the survey methodology of three activity surveys in spring, summer and autumn and static surveys of two statics per transect was chosen as appropriate for the Site and sufficient to provide suitable information on bat activity across the Site.

4.2 Bat Roost Assessments

4.2.1 The bat tree assessment identified two trees with suitability for bat roosts. Three emergence surveys undertaken of these two trees recorded a single common pipistrelle bat

4.2.2 During the emergence surveys of the two trees, a single common pipistrelle bat was recorded emerging from a woodpecker hole high up on the 4th June 2018 from tree T1. No bats emerged from tree T2.

Transect activity surveys

4.2.3 A total of four bat species were recorded during the three transect surveys:

- common pipistrelle,
- soprano pipistrelle

- nathusius pipistrelle
- noctule

- 4.2.4 A selection of two of these species were recorded on each occasion; all four were not recorded on any one survey. The dominant species recorded for all three surveys was common pipistrelle with between 90% and 100% of all passes across the surveys. The second most dominant species was soprano pipistrelle at between 6% and 10% of total passes, the other two species made up less than 1% of total passes. The diversity during the transect survey was low.
- 4.2.5 The highest levels of bat activity within the northern transect route of Fields 2 and 3 were predominantly within the area of dense scrub between the two fields (point 2F) as well as the northern boundary of Field 3 (point 2G) there was also concentration of foraging activity at the southern boundary of Field 3 (points 2J and 2I.)
- 4.2.6 The highest levels of bat activity within the southern transect route of Field 1 were predominantly along the woodland edges of the two blocks of ancient woodland, Whites Wood on the western side of the field (points 1M -1P and North Dane Wood at the southern end (points 1G-1I) there was also a concentration of foraging activity on the northern boundary of the field at point 1A.
- 4.2.7 However activity was generally low across the Site with large sections of field boundary with either no or single bat passes, such as the western boundary of Field 1 (points 1J - 1L) and western boundary of Field 2 (points 2A -2D). Figures 3 to 5 show the activity levels across the Site.

Static monitoring activity surveys

- 4.2.8 At least eight of the 15 species of bat recorded in Kent have been identified using the Site during the static monitoring surveys:
- soprano pipistrelle
 - common pipistrelle
 - *Myotis* genus
 - long-eared bat
 - noctule
 - Leisler's bat
 - Nathusius' pipistrelle
 - Serotine

- 4.2.9 Passes by bats from the *Myotis* genus which could not be identified to species level were recorded; there is no reliable way of specifically determining which *Myotis* species are present on the Site without trapping the bats and identifying them in the hand. Given the habitats present within the Site and surrounding countryside, *Myotis* species using the Site are most likely to include Natterer's *Myotis nattereri*, whiskered *Myotis mystacinus*, Brandt's *Myotis brandtii* and/or Daubenton's *Myotis daubentonii* bats.
- 4.2.10 The earliest bat passes during May, July and September were at different static points with passes around 21 minutes after sunset, however in July at SMP2 the earliest passes were from common pipistrelle bat passes and were 2 minutes after sunset. The average emergence time for this species is 20-25 minutes after sunset, and these early passes indicate that these bats were roosting close by, perhaps in the adjacent woodland.
- 4.2.11 The highest number of bat passes was recorded at SMP2, in the eastern boundary of Field 2 of the eastern field: **3,906** passes were recorded here over the three static monitoring sessions. This was closely followed by SMP3 in the north-west of the southern Field 1, with **3,591** passes. The higher levels of bat activity at SMP3 here correspond with the results of the transect surveys, where the bat foraging activity was concentrated along the edge of the White Wood ancient woodland. SMP1 on the western edge of Field 3 recorded a total of **1,694** passes. The lowest level of bat activity was at SMP4 in the south-east of the southern Field 1: just **874** passes were recorded here.

Survey Summary

- 4.2.12 Research into the habitat preferences for foraging UK bats found that habitats associated with broadleaved woodland, particularly the woodland edge, and water are more preferred for foraging, whilst arable land, moorland and improved grassland were strongly avoided (Walsh & Harris, 2006). As well as the selective preference of habitats for foraging by bats, it has also been shown that certain habitats have strong correlations with bat abundance; riverine, woodland lacustrine and vegetation corridors have a strong positive effect on bat numbers in comparison to arable land which has a strong negative relationship (Walsh & Harris, 1996). The same research highlighted that broad-leaved woodland and riparian habitats are of 'pivotal' importance to bats.
- 4.2.13 The bat activity surveys support the initial assessment of the Extended Phase 1 Habitat Survey that the Site provides moderate quality habitat for foraging and commuting bats at the margins of fields within the Site along with the areas of dense scrub between Field 2 and 3. The two adjacent areas of ancient woodland, White Wood to the west of Field 1 and North Dane Wood to the south of Field 1, provide high quality roosting habitat as well as opportunities for foraging and commuting bats. The hedgerows and dense scrub and trees which surround the three fields also provide good quality foraging and linear

landscape features for bats. However, the centres of the two fields provide lower quality habitat: all three being used to grow wheat with narrow field margins. The open fields provide little in the way of shelter for bats and are also likely to support a lower diversity of invertebrates on which bats would forage.

- 4.2.14 The surveys suggest that a moderately diverse number of bat species (eight minimum) are using the Site as commuting or foraging routes, however largely dominated by *Pipistrellus* species. A total of **9723** of all **10065** bat passes being common pipistrelle equalling **96.6%** of the total assemblage the other seven bat species accounted for **1%** or less of the total bat assemblage. The bat habitat and the species assemblage identified is therefore considered to be of **Neighbourhood Importance**.

5.0 CONCLUSIONS

- 5.1 Bat activity surveys have been undertaken at East Hill, Hempstead during the months of May – September 2018.
- 5.2 Two trees were subject to evening emergence surveys, with a roost of common pipistrelle bats identified within tree T1 on the northern boundary of Field 3. No bats were recorded using tree T2.
- 5.3 In relation to bat activity the surveys have recorded a low level of activity although a moderate diversity of bat species were recorded. The bat habitat and the species assemblage identified is therefore considered to be of **Neighbourhood Importance**.

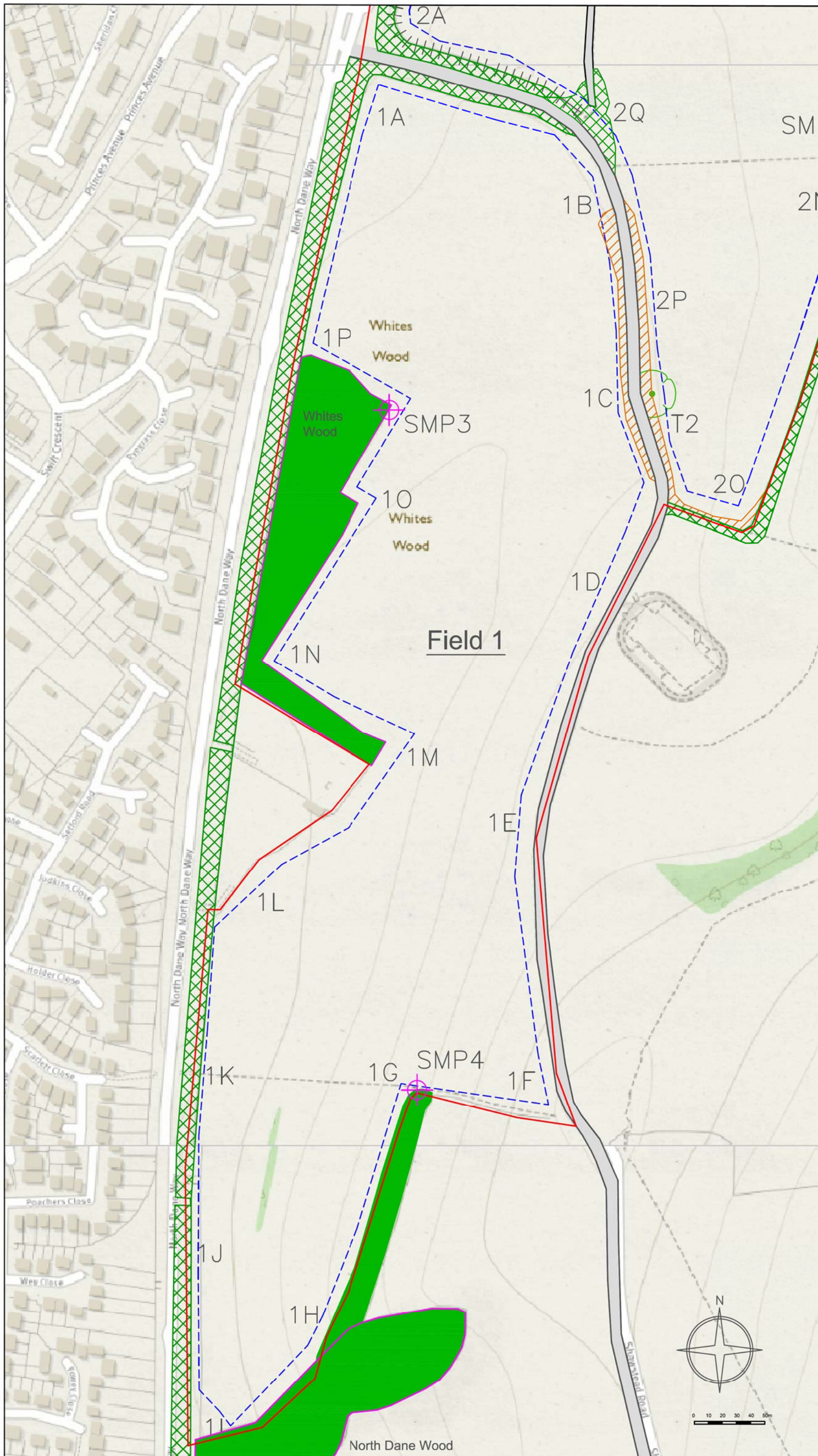
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Key

	Site Survey Area
	Transect Point 1A
	Transect Route
	Tree T1
	Broad-leaved Woodland
	Ancient Woodland Boundary
	Dense Scrub
	Tall Ruderal
	Arable Field
	Hard Standing

Ordnance Survey
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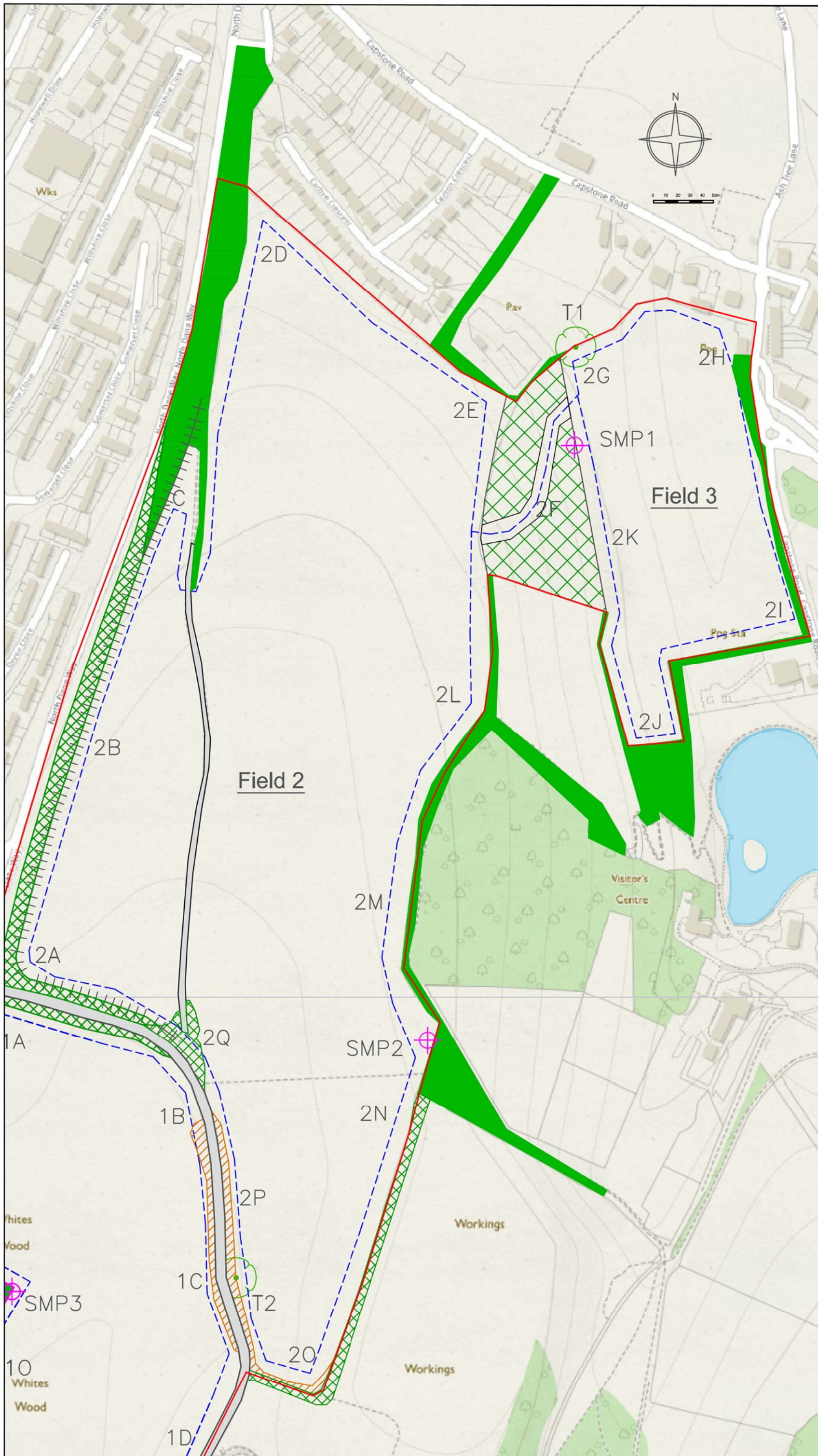
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Bat Transect and Static Plan Field 1

Figure 1

scale	size	date	drawn	checked
NTS	A3	22.02.2019	AW	HL

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Key

- Site Survey Area
- Transect Point 1A
- Transect Route
- Tree T1
- Broad-leaved Woodland
- Ancient Woodland Boundary
- Dense Scrub
- Tall Ruderal
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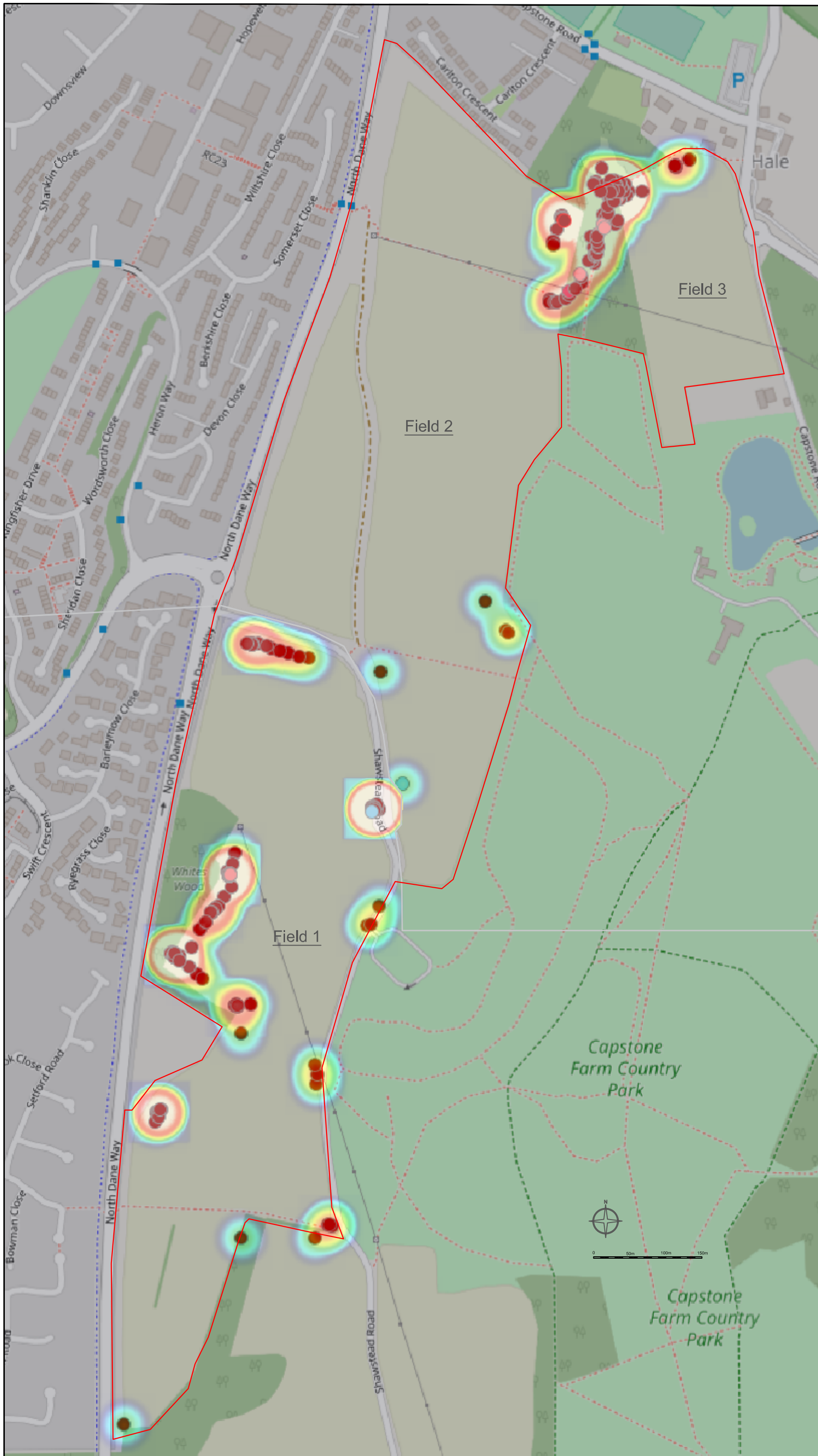
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




Title:
Bat Transect Plan Field 2 and 3

Status: drawing no. **Figure 2**

scale	size	date	drawn	checked
NTS	A3	22.02.2019	AW	HL

CAD filename: Figure_1.dwg



- Key
-  Site Survey Area
 -  Heat Map
 -  Common Pipistrelle
 -  Soprano Pipistrelle
 -  Noctule

revision	description	date	checked by

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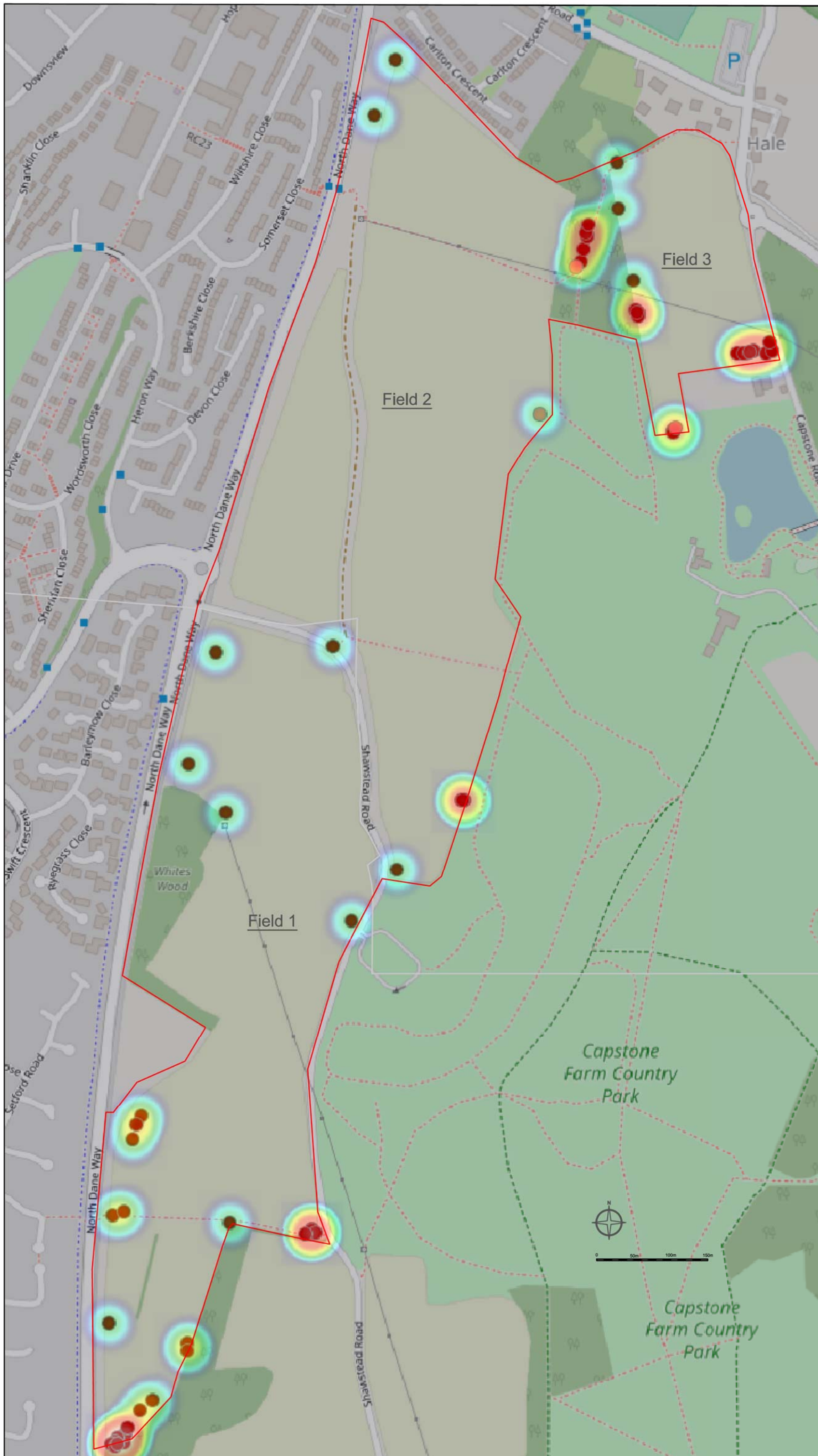


Project:
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Title:
 June 2018 Bat Activity Survey

status	drawing no.	scale	size	date	drawn	checked
	Figure 3	NTS	A3	22.02.2019	AW	HL

CAD filename: Figure_1.dwg



- Key
- Site Survey Area
 - Heat Map
 - Common Pipistrelle
 - Soprano Pipistrelle
 - Noctule

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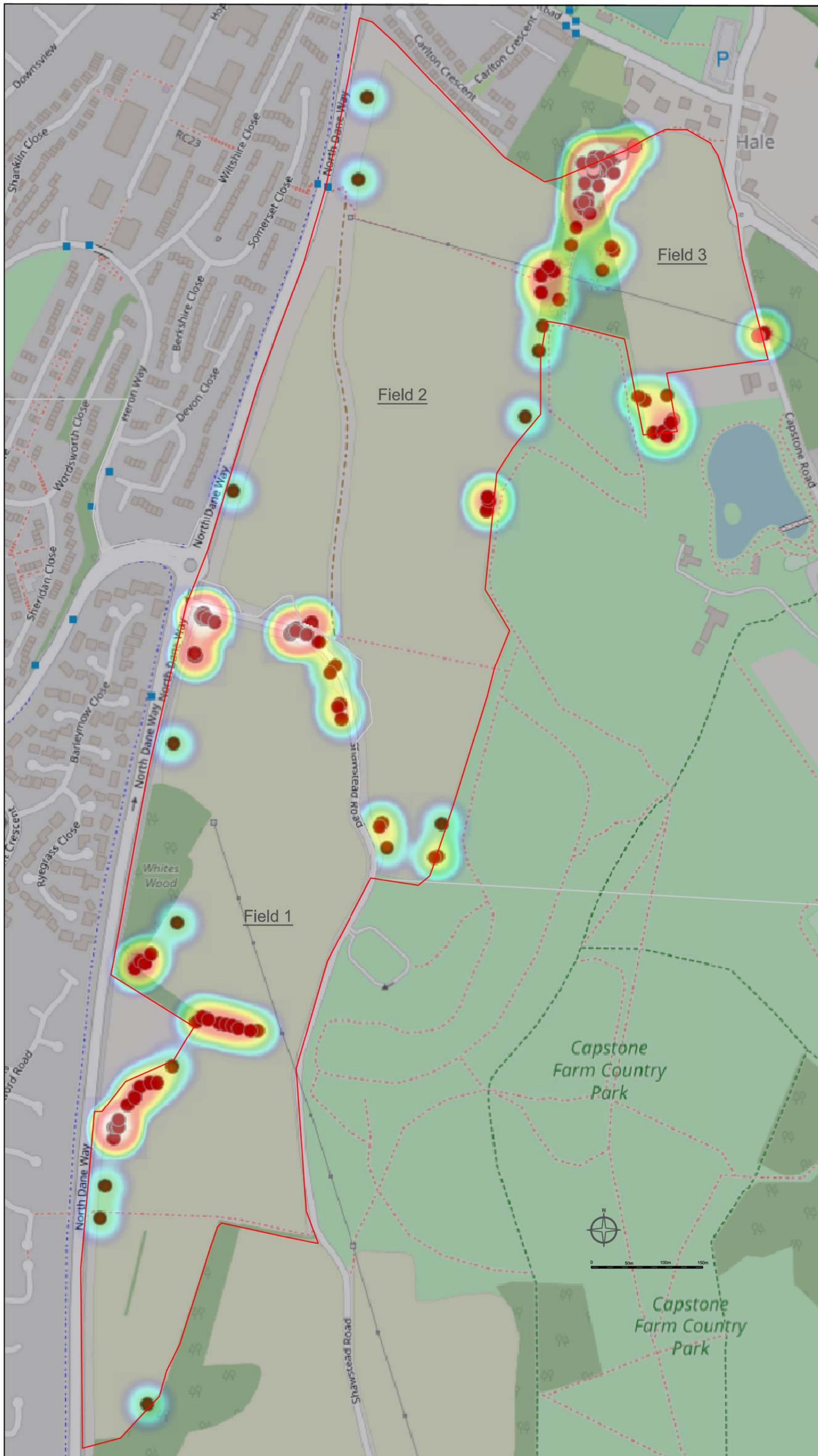
Project:
 17032 East Hill, Hempstead

Title:
 July 2018 Bat Activity Plan

Status: drawing no. **Figure 4**

scale	size	date	drawn	checked
NTS	A3	22.02.2019	AW	HL

CAD filename: Figure_1.dwg



- Key
-  Site Survey Area
 -  Heat Map
 -  Common Pipistrelle
 -  Soprano Pipistrelle
 -  Noctule

revision	description	date	checked by

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Project:
 17032 East Hill, Hempstead

Title:
 September 2018 Bat Activity Plan

Figure 5

scale	size	date	drawn	checked
NTS	A3	22.02.2019	AW	HL

CAD filename: Figure_1.dwg